The Missouri
Nonpoint Source Management Program
Annual Progress Report
For Federal Fiscal Year (FFY) 2019
Final

Prepared by the Missouri Department of Natural Resources
Division of Environmental Quality
Soil and Water Conservation Program

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Disclosure Statement

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Mission Statements

> ***The mission of the Missouri Department of Natural Resources is to:***
> *"Protect our air, land, water, and mineral resources; preserves our unique natural and historic places; and provide recreational and learning opportunities, while promoting the environmentally sound operations of businesses, communities, agriculture, and industry for the benefit of all Missourians."*
>
> ***The mission of the Missouri Nonpoint Source Management Program is to:*** "*Protect and improve the quality of the state's water resources using locally led approaches to address nonpoint source pollution impairments*."

Nonpoint source (NPS) pollution occurs when water runs over land or through the ground, picks up natural or human-made pollutants, and deposits them in surface waters or groundwater. As administrator of the Missouri NPS Program, the Missouri Department of Natural Resources (the Department) and its partners continue to make significant progress in abating or reducing NPS impairments and protecting water quality. Fulfilling the mission of the program enhances the involvement and cooperation of other agencies and citizens of the state.

The Department follows a watershed framework to help address local water resource issues. The framework creates a locally led and coordinated approach for planning, protecting and restoring water resources in Missouri. Through this process, the Department provides technical and financial support to landowners, communities, and local leaders to assist them in setting priorities for planning and implementation of voluntary land management practices to address water quality impairments or prevent threats of impairment in healthy watersheds. The framework not only provides direction and focus for the Department's Section 319 NPS program, it is a priority of Missouri's Nonpoint Source Management Plan (NPSMP). The long-term goal of the NPSMP is to conduct planning and implementation, as interests allow, in all 66 Hydrologic Unit Code (HUC)-8 basins within the state (Appendix A).

The NPS program annual report provides an overview of the progress and/or efforts being made by the Department and its partners to protect and address waters impaired by NPS runoff through the Section 319 grant program during Federal Fiscal Year (FFY) 2019 (October 1, 2018 through September 30, 2019).

II. Missouri's Key NPS Program Components

A NPSMP is required for states to be eligible to receive federal Section 319 grant dollars. Missouri's NPSMP is a five-year action plan that incorporates the most recent U.S. Environmental Protection Agency (EPA) guidance, *Nonpoint Source Program and Grants Guidelines for States and Territories, April 12, 2013* (http://water.epa.gov/polwaste/nps/upload/319-guidelines-fy14.pdf) and *Section 319 Program Guidance: Key Components of an Effective State Nonpoint Source Management Program November 2012* (https://www.epa.gov/sites/production/files/2015-10/documents/key_components_2012.pdf). The following are eight key components of a NPSMP.

1. The state program contains explicit short and long-term goals, objectives, and strategies to protect surface water and ground water as appropriate.

2. The state strengthens its working partnerships and linkages to appropriate state, interstate, tribal, regional and local entities (including conservation districts), private sector groups, citizen groups, and federal agencies.

3. The state uses a combination of statewide programs and on-the-ground projects to achieve water quality benefits; efforts well integrated with other relevant state and federal programs.

4. The state program describes resource allocation between (a) abating known water quality impairments from NPS pollution and (b) protecting threatened and high-quality waters from significant threats caused by present and future NPS activities.

5. The state program identifies waters and their watersheds impaired by NPS pollution as well as priority unimpaired waters for protection. The state establishes a process to assign priority and progressively address identified watersheds by conducting more detailed watershed assessments, developing watershed based plans (WBP), and implementing the plans.

6. The state implements all program components required by section 319(b) of the Clean Water Act, and establishes strategic approaches, and adaptive management to achieve and maintain water quality standards as expeditiously as practicable. The state reviews and upgrades program components as appropriate. The state program includes a mix of regulatory, non-regulatory, financial and technical assistance, as needed. In addition, the state incorporates existing baseline requirements established by other applicable federal or state laws to the extent that they are relevant.

7. The state manages and implements its program efficiently and effectively, including necessary financial management.

8. The state reviews and evaluates its NPS management program using environmental and functional measures of success, and revises its NPS management program at least once every five years.

To achieve the goals and objectives of the NPS Program Mission and address the Key Components of the NPSMP, the Department developed strategies and milestones to track progress and the accomplishments of the Department and its many partners (i.e., stakeholders, state and federal agencies, local governments, nonprofits organizations, municipalities, etc.).

III. Accomplishment of Goals and Objectives

The goals of Missouri's NPSMP achieved using a 9-element watershed planning and implementation approach provides a framework to engage local watershed citizens and allow them to coordinate various locally led activities to address priority NPS watershed concerns through the implementation of voluntary measures. Described below are long, mid, and short-term goals and objectives of the NPSMP along with a fiscal year status update.

Long-Term Goal

Protect and restore water quality affected by NPS pollution through assessment, monitoring, abatement, implementation, and education.

Objectives:

1. Focus NPS abatement efforts, implementation strategies and available resources in watersheds and water bodies identified as impacted by NPS pollution.
2. Address restoration of impaired waters through implementation of 9-element WBPs or acceptable alternative plans.
3. Protect existing high quality or high value waters by preventing significant NPS threats from present and future activities.
4. Prioritize non-impaired state high quality waters, outstanding resource waters and threatened waters and develop strategies to protect and enhance them. See Appendix E for the most recent Section 305(b) report (Other Waters Rated as Impaired and Believed to be Impaired but not on the Section 303(d) list) or Appendix F of the most recent Section 305(b) report (Other Potentially Impaired Waters). Appendix E and F of the Missouri Integrated Water Quality Report (Section 305(b) Report) are available at: https://dnr.mo.gov/env/wpp/waterquality/303d/docs/2016-ir-305b-report.pdf.
5. Support protection of public water supplies and karst areas.
6. Support restoration and protection of wetlands and riparian areas.

Through these efforts and partnerships, it is the Department's vision to continue to report many success stories.

Success Story

A primary measure of state NPS success taken directly from EPA's 2018-2022 strategic plan: Goal 1: Cleaner, Healthier Environment, Objective1.2 Provide for Clean and Safe Water is a long-term goal to reduce the number of square miles of watershed with surface water not meeting standards by 37,000 square miles.

For the timeframe of 2006-2018, Missouri submitted 11 success stories for 17 water bodies removed from the 303(d) list of impaired waters using 319 NPS efforts and a collaborative watershed based approach to meet water quality standards (WQS). These stories are available from EPA's website (https://www.epa.gov/nps/success-stories-about-restoring-water-bodies-impaired-nonpoint-source-pollution#mo).

Below is a summary of the Department's success story that submitted to EPA for FFY 2019. The full success story will be available in the future from EPA's website: https://www.epa.gov/nps/success-stories-about-restoring-water-bodies-impaired-nonpoint-source-pollution#mo.

Planning and Partnerships Improve Water Quality in McCoy Creek

Because of impacts from urban and agricultural runoff, McCoy Creek is on Missouri's Clean Water Act (CWA) section 303(d) list of impaired waters for low dissolved oxygen (DO) in 2012. To address the impairment and concerns about future urban growth, partners completed a 9-element WBP for the Dry Branch Creek watershed (a subwatershed of McCoy Creek) and implemented green infrastructure projects and best management practices (BMPs) in agricultural areas within the watershed. Water quality data collected in 2016 showed that all DO concentrations met the state's water quality standard (WQS), resulting in a segment of McCoy Creek being removed from the CWA section 303(d) in 2018.

Mid-Term Goal

Achieve full support of designated aquatic life uses and recreational uses in 25% of nonpoint source pollution impaired water bodies by 2030.

Achieving full support of designated aquatic life uses is a primary driver for the NPS Program because biotic assemblages are excellent indicators of water quality. Restoration and protection of aquatic life uses is a key objective of the federal CWA. Priorities considered for this mid-term NPSMP goal includes objectives and strategies for implementing the goal:

Objectives:

1. **Annually conduct aquatic biomonitoring for concerns related to watershed wide NPS problems and compare targeted sites to reference sites.**

   Strategy a) Use data from these and partner sites to determine full support of designated aquatic life uses in watersheds with NPS impairments.

   STATUS:
   In SFY 2019 (July 1 2018 – June 30, 2019), the Department monitored a total of 34 stream sites on 10 wadeable streams, and an additional 18 sites as part of the small headwater reference stream study. For SFY 2020 (July 1, 2019 – June 30, 2020), the Department monitored nine sites as part of the small headwater reference stream study and plans to monitor 35 stream sites on 19 wadeable streams; 32 of these sites were monitored as of November 2019. The Missouri Department of Conservation (MDC) also collected invertebrate and fish community data in streams categorized as small to large rivers (stream orders three to five) as part of their Resource Assessment and Monitoring (RAM) program.

   The RAM Program formed through a partnership between the Department and MDC to conduct probability-based and long-term monitoring to meet CWA Section 305(b) and 303(d) reporting requirements. To ensure effective monitoring in all regions of the state, sampling is on a five-year cycle with a periodic pause to analyze information and determine locations that warrant additional monitoring. In general, two years of RAM monitoring efforts are spent monitoring streams in the Central Plains subregion, two

years in the Ozark subregion, and one year in the Mississippi Alluvial Basin subregion. The RAM program samples water quality and habitat, and compares the information to healthy sites to determine benchmarks for restoration efforts. The Department enters other organization's information into the water quality assessment database if they collect biological samples that follow procedures similar to or consistent with the Department's protocols. If the Department is aware that other aquatic biomonitoring data exists, that information helps determine additional data collection efforts needed. The Department's water quality data search feature is located at this site: https://apps5.mo.gov/mocwis_public/wqa/waterbodySearch.do.

The Department's Environmental Services Program bioassessment database provides access to raw data and summarized statistics for all quantitative macroinvertebrate samples. Updates to this database take place following each sampling season (spring and fall). The database is available to the public online at: http://dnr.mo.gov/env/esp/Bioassessment/index.html.

The most recent (2018) Missouri Integrated Water Quality Report (https://dnr.mo.gov/env/wpp/waterquality/303d/documents/2018-305b-ir-final.pdf) summarizes the health of the biological community (fish and aquatic macroinvertebrates) for the state. The aquatic macroinvertebrate assessments indicate a total of 264 miles of Missouri's classified streams (0.2% of total stream miles) are impaired. Fish bioassessments indicate an additional 369 stream miles (0.3% of total stream miles) are impaired. Fish Index of Biotic Integrity (IBI) scores determine the percentage of streams that fully support aquatic life use. Data were restricted to third through fifth order streams in the Ozark subregion, and only IBI scores with accompanying habitat assessments. In cases of poor habitat quality, that does not fully support the fish community, the data were excluded from further assessment. The resulting Fish IBI scores are reflective of instream water quality conditions. Fish IBI scores greater than 36 indicate aquatic life use is fully supportive, whereas scores of 29-36 indicate a community is suspected to be impaired but is at least partially in attainment, and scores less than 29 suggest the community is impaired and aquatic life use is not supported. Six separate metrics determine fish habitat scores: (1) substrate quality, (2) channel disturbance, (3) channel volume, (4) channel spatial complexity, (5) fish cover, and (6) flow tractive force and water velocity. To date, this is the best overall indicator of habitat condition as assessed using MDC's RAM protocol. Final selection of Fish IBI scores incorporates MDC staff's best professional judgment to insure uncompromised surveys. IBI scores in this summary are from 192 fish surveys representing approximately 2,590 miles. Classified streams third to fifth order in size contribute to approximately 9,843 stream miles in the Ozarks. Table 1 includes complete results.

Table 1. Probability-based Support Summary of Aquatic Life Use in Ozark Streams

Project Name	MDC RAM Program
Type of Water Body	Stream
Target Population	Third to Fifth Order, Ozarks Ecoregion
Size of Target Population #sites/miles	192 assessments / 2,589.9 miles
Units of Measurement	Classified Streams Miles
Designated Use	Aquatic Life
Percent, Miles Attaining	71.4%, 7,048 miles
Percent, Miles Not Attaining	14.1%, 1,437 miles
Percent, Miles Non-Response (Suspect)	14.6%, 1,388 miles
Indicator	Biological – Fish IBI
Assessment Date	7/31/2015

Strategy b) Add additional biomonitoring sites in watersheds with EPA 9-element WBPs to track aquatic life impacts with plan implementation.

STATUS:
Annually, the Section 319 Program works with the Department's Water Protection Program to coordinate biomonitoring efforts within 9-element WBPs. During the last fiscal year, the Department conducted biomonitoring on Little St. Francis River, Saline Creek, Village Creek, Stinson Creek, and North for Spring River during state fiscal year 2019, and Stinson Creek, Bryant Creek, Buffalo, Douger/Chat Creek during state fiscal year 2020. EPA accepted the North Fork Spring Watershed Plan, located in the Spring watershed.

Strategy c) Track the number of projects implemented where EPA 9-element WBP, healthy watershed plans, source water protection plans and other watershed partner projects such as United States Department of Agriculture (USDA) Natural Resources Conservation Service's (NRCS) Regional Conservation Partnership Program (RCPP) and Mississippi River Basin Healthy Watersheds Initiative (MRBI) are developed.

i. Estimate eight other plans (healthy watershed plans, source water protection plans, and partner projects, etc.) per year and percent implemented.

STATUS:
1. Please see Goal VI. Partnerships and Goal VII. Funding for a detailed description of the RCPP accomplishments during the last year and a summary of past MRBI activities.

2. For FFY 2019, seven projects/plans for Source Water Protection awarded funding (Table 2).

Table 2. Projects/Plans for Source Water Protection

Community	Status	Award Amount
Public Water Supply District (PWSD) # 4 of Scott County Missouri	Completed	$3,825.00
City Utilities of Springfield Missouri	In progress	$15,000.00
Consolidated Public Water Supply District #1 Barton, Dade, Cedar and Jasper	Completed	$9,401.25
City of Sarcoxie	Completed	$6,750.00
Linn - Livingston PWSD #3	Completed	$7,215.00
City of Rock Port	Completed	$15,000.00
Public Water Supply District # 9 of Boone County	In progress	$2,500.00
	TOTALS	**$59,691.25**

ii. Estimate eight 319 projects implementing 9-element WBPs per year and percent project completion.

Watershed plans are living documents that not intended for one single entity to address and resolve all issues stated in the plan. This will take time, many partners, and multiple projects over time. Several projects funded during FFY 2019 with Section 319 NPS Grant funds that were or are implementing portions of a 9-element WBP are below. The status of the projects is by 0-25%, 26-50%, 51-75%, and 76-100% completion.

STATUS:

1. Missouri Botanical Garden – Deer Creek Watershed Initiative Phase III (76-100% complete)
2. Schuyler County SWCD – North and Middle Fabius WQ Improvement and Restoration Project Phase II (76-100% complete)
3. Watershed Committee of the Ozarks (WCO) – Little Sac Restoration and Improvement Project (70% complete)
4. Lake Ozarks Watershed Alliance (LOWA) – LOWA Low Impact Landscapes (LILs) and Clean Marina (76-100% complete)
5. The Nature Conservancy – Kiefer Creek Streambank Stabilization Project (agreement drafted)
6. Harry S. Truman Coordinating Council– Spring River Watershed Planning Support and Coordination (100% completed)
7. James River Basin Partnership – Wilsons Creek Implementation Project (76-100% complete)

Strategy d) Track NPS water body/pollutant pairs that addressed by EPA 9-element WBP, healthy watershed plans, source water plans and other watershed partner projects such as USDA NRCS RCPP and MRBI.

- Track approximately 43 NPS water body/pollutant pairs to determine the percentage addressed by plans and partner projects.

STATUS:
Source Water Protection Plans that address impairment/pollutant water body pairs.

North Fork Salt

- **Clarence Cannon Wholesale Water Commission (CCWWC)** – Black Creek. CCWWC's efforts to restore designated uses to improve water quality in the Black Creek watershed are document in the source water protection plan. The pollutant address is bacteria as indicated by the presence of *E. coli* in Black Creek.
- **Kirksville** – Forest Lake impaired for chlorophyll-a, N, and P (unless changed along with addition of new nutrient criteria) – same is true for Hazel Creek Lake (only impaired for chlorophyll-a)
- **Shelbina** – Shelbina city lake is impaired for nutrients

Lower Grand

- **North Central Missouri Regional Water Commission** – Locust Creek and East Fork Locust Creek both impaired for *E. coli*. Plan also addresses sediment (neither stream is technically impaired for sediment, even though they both exhibit sediment loading).
- **Marceline** – New Marceline City Lake impaired for nutrients

Lower Marais des Cygnes

- **Butler** – Butler Lake is impaired for nutrients in addition to Miami Creek.

Upper Grand

- **Cameron** – Cameron Lake #4 (Grindstone Reservoir) is impaired for nutrients.
- **Maysville** – Willow Brook Lake impaired for nutrients

Upper St. Francis

- **Fredericktown** – The city lake is now also impaired for nutrients.

Lower Missouri Crooked

- **Higginsville** – Higginsville South Lake is impaired for nutrients
- **Shelbina** – Shelbina city lake is impaired for nutrients

Existing plans that are not currently 'active' (expired Departmental endorsement)

Black Water

- **Concordia** – E. A. Pape Lake is impaired for nutrients. The Department's endorsement of Concordia's protection plan is expired, so it is unclear if the city is actively implementing protections, but they do have an existing plan.

South Grand

- **Harrisonville** – Harrisonville City Lake and North Lake (classified as L3 lake, but should be L1) impaired for nutrients

Salt

- **Vandalia** – Vandalia reservoir impaired for nutrients

There was no new development of Healthy Watershed Plans during the FFY 2019. However, the watershed information provided useful information for the development of 9-element watershed planning activities. Below is a list of Healthy Watershed Plans along with the pollutants of concern. The Department continues to seek eligible entities

to gain their interest in developing 9-element WBPs. Projects noted with an asterisk indicates a potential sponsor has been contacted (*) and/or efforts are occurring under other funding opportunities (**).

- **Big River Watershed Summary****
- **Independence Sugar Watershed Summary***
- **Lower Grand Healthy Watershed Plan***
    - Nutrients
    - *E. coli*
    - Low dissolved oxygen
    - Aquatic macroinvertebrates
    - Sediment
- **Lower Missouri Watershed Summary**
- **Lower Missouri-Crooked Watershed Summary**
- **Lower Missouri-Moreau Watershed Summary****
- **Meramec River Healthy Watershed Plan****
    - Nutrients
    - *E. coli*
    - Sediment
    - Metals in sediment (lead, zinc, cadmium, copper)
    - Mercury in fish tissue from atmospheric deposition
    - Chloride
    - pH
- **Niangua River Healthy Watershed Plan***
    - *E. coli*
    - Low dissolved oxygen

  West Fork Niangua River TMDL target reductions to:
    - Nutrients
    - Sediment
    - Ammonia
    - Bio-chemical oxygen demand
- **North Fork Salt Healthy Watershed Plan**
    - Nutrients
    - *E. coli*
    - Low dissolved oxygen
    - Mercury in fish tissue from atmospheric deposition
    - Low aquatic life
    - Sediment
    - Bio-chemical oxygen demand
- **Sac River Plan Healthy Watershed Plan***
    - Nutrients
    - *E. coli*
    - Low aquatic life
    - Low dissolved oxygen
    - Mercury in fish tissue from atmospheric deposition
    - Sediment
- **Salt Watershed Summary**

- **South Fork Salt Watershed Summary**
- **Spring Watershed Summary****
- **Upper Mississippi Cape Healthy Watershed Plan****
    - Nutrients
    - *E. coli*
    - Sediment

Section Goal VII. Objective 2 provides planning activities completed by USDA NRCS.

2. Annually conduct bacterial monitoring for concerns related to watershed-wide NPS problems that affect recreational uses.

Strategy a) Use data from these and partner sites to determine full support of recreational uses in watersheds with NPS impairments.

STATUS:

The Department conducts weekly bacterial monitoring each year during the recreational season for 14 lakes in the Missouri State Park System and a total of 18 designated state park beaches. Water sample analysis for *E. coli* is complete and information posted on the Department's beach status website (http://dnr.mo.gov/asp/beaches/index.html). The water sample results help visitors decide whether a particular beach is suitable for swimming based on the bacteria levels. In accordance with state law (http://revisor.mo.gov/main/Home.aspx), the Department posts signs notifying visitors that swimming is not recommended if the geometric mean of the weekly water quality sample results exceeds 190 *E. coli* colonies per 100 milliliters of water (190 mpn[1]/100 ml). In addition, the U.S. Army Corps of Engineers (USACE) generally collects bacteriological data prior to the three major holidays (e.g., Memorial Day, 4th of July, and Labor Day). Swimming beach lake closures are posted on the USACE individual lake webpages. In the most recent (2018) Missouri Integrated Report (https://dnr.mo.gov/env/wpp/waterquality/303d/documents/2018-305b-ir-final.pdf) bacteria (fecal coliform and *E. coli*) are listed as a cause of impairment for 3,921 miles of Missouri's classified streams (3.3% of total stream miles).

The Department collected several surface water samples from various streams statewide in accordance to the Department's ambient monitoring program and funded through various funding mechanisms (e.g., Section 319 and106 grant funds), with 36 stream sites monitored for *E. coli* during state FY 2019 and in FY 2020.

The Department solicits a call for water quality data during the 303(d) listing cycle and uses data for the 303(d) assessment process if collected following appropriate quality assurance and quality control procedures. A subset of water quality data sources available from the Department's website are: https://dnr.mo.gov/env/wpp/waterqualitydatasources.htm. All data used for the 303(d) assessment process is available at: https://apps5.mo.gov/mocwis_public/wqa/waterbodySearch.do. See additional

[1] MPN: most probable number.

information about the 303(d) assessment process and the listing methodology at https://dnr.mo.gov/env/wpp/waterquality/303d/303d.htm.

Short-Term Goals

GOAL I. Support water quality monitoring throughout the state.

Objective:

1. **Provide NPS program monitoring priorities and data needs to the Division of Environmental Quality's (DEQ) Watershed Protection Section.**

Strategy a) Develop water quality monitoring components specific to NPS program needs for the Department's annual monitoring strategy (e.g., long-term ambient NPS monitoring program and watershed trend monitoring) in accordance with the Missouri Water Quality Monitoring Strategy which is reviewed every two years and no less than every five years (also provided to EPA Region 7) (http://dnr.mo.gov/env/wpp/waterquality/303d/docs/2015-monitoring-strategy-final.pdf).

STATUS:
Monitoring Strategy: Updates and revisions to the Monitoring Strategy is ongoing.

Water Quality Monitoring: Three general types of water quality monitoring are used. These three are fixed stations, intensive surveys and screening level monitoring. A fixed station monitoring program collects a selected group of analytes at predetermined sites on a regular schedule. Fixed station programs typically collect water quality data at the same sites for several years. Intensive surveys typically employ several monitoring sites in a small geographic area and sample with greater frequency, often multiple times per day. The duration of most intensive surveys is short, often lasting only one to a few days. These surveys are often repeated multiple times over a one to three-year period. Screening level monitoring generally includes low intensity, short duration monitoring activities. These activities typically provide smaller datasets, but have the advantage of monitoring more sites for the monitoring resources expended. The Department's monitoring plan for FFY 2019 is shown in Appendix B (the Department developed a combined state FY 2019-2020 work plan for monitoring efforts funded with federal and state funds). The state FY is July 1 – June 30 and overlaps two federal FYs. Therefore, the monitoring activities described in Appendix B provide an overview for work planned in the state FY 2019 and 2020 PPG.

Ambient Water Quality Monitoring Network (fixed station)

The Department executed the FFY 2019 agreement for this network for $1,366,457, using no 319 program funds, but with a combination of other eligible state and federal funds to support this effort.

The Department collaborates with the USGS to support the state's ambient water quality monitoring network, also called the fixed station network. The network allows for collection of high-quality assured data over a long time period, providing an important basis for water quality decisions in the state. This data has several important applications including, but not limited to, the development and revision of water quality standards, development of water quality-based discharge permits, development of TMDL studies, assessment of long-term water quality trends, and the efficacy of the Department's water quality protection and monitoring activities.

A very large percentage of Missouri's NPS monitoring effort focuses on long-term monitoring of watersheds rather than short-term monitoring related to single watershed projects. In some instances, short-term project specific water quality monitoring (one to two years of pre-project monitoring and two to three years of post-project monitoring) can be effective. This type of monitoring is effective if the proposed watershed project makes very large reductions in one or more NPS pollutants (i.e., 50% or greater projected reductions) and the pollutant in question is one which cycles through a watershed within a year or less (i.e., pesticides, bacteria).

For NPS pollutants such as suspended solids, nitrogen, phosphorus, and for long-term trends in bacteria, very large load reductions by a single three to five-year watershed project are not likely. Sediment and organic soil-bound nitrogen and phosphorus may take decades or longer to cycle through a watershed. No two rainfall events that produce NPS pollution are the same. Because interactions of storm events (i.e., intensity, duration and location within watersheds) and the many variables related to the condition of the watershed (i.e., soil moisture, amount and nature of vegetative cover, soil type, slopes), a typical project specific water quality monitoring effort rarely captures the true changes brought about by the project. Instead, over 90% of the water quality variation measured is due to the intensity and timing of rain events, and how they correspond to sampling times. Only a very small amount of the total variation in water quality measured is due to the watershed project in most cases. This small amount is not easily separated from the larger sources of variation not related to the project.

Thus, the best monitoring strategy is to maintain long-term water quality monitoring in watersheds where many watershed projects occurred or expected to occur in the future. This type of monitoring has two advantages: the long-time span allows the monitoring to track the combined effects of multiple projects within the watershed, and the monitoring results in much larger data sets for more powerful statistical analysis of data. These analyses include time trend analysis and the ability to separate sources of non-project related variables such as flow, position of hydrograph, time of year, and the ability to make correlations between water quality variables.

Therefore, most of Missouri's NPS monitoring is for long-term fixed station monitoring, with shorter term project specific monitoring reserved primarily for projects for which this type of monitoring may be effective.

The Department funds discrete water-quality monitoring at 71 USGS long-term monitoring stations, one streamflow gage at Black Creek below Shelbyville, Missouri,

and two continuous water-quality monitors on the Missouri River at Herman and St. Joseph, Missouri. The USGS annually contributes approximately $180,000 of their federal funding to this effort. Much of this data is available on the Internet at: http://mo.water.usgs.gov/. Table 3 provides a list of water quality monitoring stations sampled through the Missouri Ambient Water Quality Monitoring Network.

Table 3. Ambient Water Quality Program Stream Monitoring Sites

Missouri Department of Natural Resources -- U.S. Geological Survey Cooperative Ambient Water-Quality Program October 1, 2018 - September 30, 2019											
Station Number	**Station Name**	**Lab Schedule / Code**						**Data Collection/ Processing**	**Lab Analysis**	**Gage O & M**	**Total**
		86	**1146**	**LC169**	**2033**	**1904**	**1630**				
05495000	Fox River at Wayland	6	2	4				$11,520	$1,958		$13,478
05496000	Wyaconda River above Canton	6	2	4				11,520	1,958		$13,478
05497150	North Fabius River near Ewing	6	2	4				11,520	1,958		$13,478
05500000	South Fabius River near Taylor	12	4	8				23,040	3,916		$26,956
05503100	Black Creek below Shelbyville, MO									$14,400	$14,400
05514500	Cuivre River near Troy	6	2	4				11,520	1,958		$13,478
05587455	Mississippi River below Grafton	12		8		4	4	23,040	4,384		$27,424
06817700	Nodaway River near Graham	6	2	4				11,520	1,958		$13,478
06818000	Missouri River at St. Joseph	12	4	8				23,040	3,916		$26,956
06821190	Platte River at Sharps Station	6	2	4				11,520	1,958		$13,478
06894100	Missouri River at Sibley	12	4	8				23,040	3,916		$26,956
06896187	Middle Fork Grand River near Grant City	6	2	4				11,520	1,958		$13,478
06898100	Thompson River at Mt. Moriah	6	2	4				11,520	1,958		$13,478
06898800	Weldon River at Princeton	6	2	4				11,520	1,958		$13,478
06899580	No Creek near Dunlap	12	4	8				23,040	3,916		$26,956
06899950	Medicine Creek near Harris	12	4	8				23,040	3,916		$26,956
06900100	Little Medicine Creek near Harris	12	4	8				23,040	3,916		$26,956
06900900	Locust Creek near Unionville	12	4	8				23,040	3,916		$26,956
06902000	Grand River near Sumner	12	4	8				23,040	3,916		$26,956
06905500	Chariton River near Prairie Hill	6	2	4				11,520	1,958		$13,478
06905725	Mussel Fork near Mystic	12	4	8				23,040	3,916		$26,956
06906300	East Fork Little Chariton River	6	2	4				11,520	1,958		$13,478

Missouri Department of Natural Resources -- U.S. Geological Survey Cooperative Ambient Water-Quality Program October 1, 2018 - September 30, 2019											
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		86	**1146**	**LC169**	**2033**	**1904**	**1630**				
	near Huntsville										
06907300	Lamine River near Pilot Grove	9	3	6				17,280	2,937		$20,217
06917630	East Drywood Creek at Prairie State Park	6	2	4				11,520	1,958		$13,478
06918070	Osage River above Schell City	6	2	4	6			11,520	5,450		$16,970
06918600	Little Sac River near Walnut Grove	12	4	8				23,040	3,916		$26,956
06921070	Pomme de Terre River near Polk	9	3	6				17,280	2,937		$20,217
06921590	South Grand River at Archie	6	2	4				11,520	1,958		$13,478
06923700	Niangua River at Bennett Spring	6	2	4				11,520	1,958		$13,478
06926510	Osage River below St. Thomas	6	2	4				11,520	1,958		$13,478
06927850	Osage Fork Gasconade River near Lebanon	6	2	4				11,520	1,958		$13,478
06928440	Roubidoux Spring at Waynesville	6	2	4				11,520	1,958		$13,478
06930450	Big Piney River at Devils Elbow	9	3	6				17,280	2,937		$20,217
06930800	Gasconade River above Jerome	12	4	8				23,040	3,916		$26,956
07014000	Huzzah Creek near Steelville	6	2	4				11,520	1,958		$13,478
07014200	Courtois Creek at Berryman	6	2	4				11,520	1,958		$13,478
07014500	Meramec River near Sullivan	12	4	8				23,040	3,916		$26,956
07016400	Bourbeuse River above Union	9	3	6				17,280	2,937		$20,217
07018100	Big River near Richwoods	9	3	6				17,280	2,937		$20,217
07019280	Meramec River at Paulina Hills	12	4	8				23,040	3,916		$26,956
07020550	South Fork Saline Creek near Perryville	6	2	4				11,520	1,958		$13,478
07021020	Castor River at Greenbriar	6	2	4				11,520	1,958		$13,478
07036100	St. Francis River near Saco	9	3	6				17,280	2,937		$20,217
07037300	Big Creek at Sam A. Baker State Park	6	2	4				11,520	1,958		$13,478
07042450	St. John's Ditch at Henderson Mound	9	3	6	6			17,280	6,429		$23,709

Missouri Department of Natural Resources -- U.S. Geological Survey Cooperative Ambient Water-Quality Program October 1, 2018 - September 30, 2019											
Station Number	**Station Name**	**Lab Schedule / Code**						**Data Collection/ Processing**	**Lab Analysis**	**Gage O & M**	**Total**
		86	**1146**	**LC169**	**2033**	**1904**	**1630**				
07046250	Little River Ditches near Rives	12	4	8	6			23,040	7,408		$30,448
07050150	Roaring River Spring at Cassville	6	2	4				11,520	1,958		$13,478
07052152	Wilson Creek near Brookline	12	4	8				23,040	3,916	14,400	$41,356
07052250	James River near Boaz	6	2	4	6			11,520	5,450	14,400	$31,370
07052345	Finley Creek below Riverdale	12	4	8				23,040	3,916	14,400	$41,356
07052500	James River at Galena	12	4	8				23,040	3,916	4,100	$31,056
07052820	Flat Creek below Jenkins	12	4	8				23,040	3,916		$26,956
07053700	Lake Taneycomo at Branson	6	2	4				11,520	1,958		$13,478
07053900	Swan Creek near Swan	6	2	4				11,520	1,958		$13,478
07057500	North Fork River near Tecumseh	6	2	4				11,520	1,958		$13,478
07057750	Bryant Creek below Evans	6	2	4				11,520	1,958		$13,478
07061600	Black River below Annapolis	6	2	4				11,520	1,958		$13,478
07066110	Jacks Fork above Two River	12	4	8				23,040	3,916		$26,956
07067500	Big Spring near Van Buren	4	2	2				7,680	1,620		$9,300
07068000	Current River at Doniphan	12	4	8				23,040	3,916		$26,956
07068510	Little Black River below Fairdealing	6	2	4				11,520	1,958		$13,478
07071000	Greer Spring at Greer	4	2	2				7,680	1,620		$9,300
07071500	Eleven Point River near Bradley	6	2	4				11,520	1,958		$13,478
07185764	Spring River above Carthage	12	4	8				23,040	3,916		$26,956
07186480	Center Creek near Smithfield	9	3	6				17,280	2,937		$20,217
07186600	Turkey Creek near Joplin	9	3	6				17,280	2,937		$20,217
07187000	Shoal Creek above Joplin	12	4	8				23,040	3,916		$26,956
07188838	Little Sugar Creek near Pineville	12	4	8				23,040	3,916		$26,956
07189000	Elk River near Tiff City	12	4	8				23,040	3,916		$26,956
07189100	Buffalo Creek at Tiff City	12	4	8				23,040	3,916		$26,956
	Quality Assurance Samples							34,770	31,646		$66,416
	subtotal							$1,173,330	$240,227	$61,700	$1,475,257

Missouri Department of Natural Resources -- U.S. Geological Survey Cooperative Ambient Water-Quality Program October 1, 2018 - September 30, 2019											
Station Number	**Station Name**	**Lab Schedule / Code**						**Data Collection/ Processing**	**Lab Analysis**	**Gage O & M**	**Total**
		86	**1146**	**LC169**	**2033**	**1904**	**1630**				
06818000	Missouri River at St. Joseph	Operate and maintain continuous water-quality monitor, Oct 2018, Apr-Sept 2019									$20,000
06934500	Missouri River at Hermann	Operate and maintain continuous water-quality monitor, Oct 2018, Apr-Sept 2019									$20,000
	Publish annual data summary										$31,200
	Total										$1,546,457
										USGS share	$180,000
										MDNR share	$1,366,457
Field Parameters:		Water temperature, air temperature, discharge, specific conductance, pH, alkalinity, dissolved oxygen, %saturated oxygen, *E. coli*, fecal coliform									
Schedule 86:		Nutrients									
Lab code 0169:		Total residue									
Schedule 1146:		Trace metals and major ions									
Schedule 2033:		Pesticides									
Schedule 1904:		Major ions									
Schedule 1630:		Trace metals and major ions									

In FFY 2018, the Department entered into a cooperative agreement with USGS for the analysis of the entire ambient water quality monitoring network to determine data trends. The analysis of the network and the data trends covers a two-year timespan (January 1, 2018 through June 30, 2020). Funds for this agreement are budgeted from the FFY 2016 319 Implementation Grant. The agreement shows the USGS contribution to be $50,000 and the Department's contribution to be $313,000.

The ambient water quality monitoring network forms the foundation of Missouri's water quality monitoring and assessment activities. Monitoring and assessment information, in turn, forms the foundation of most other activities undertaken within the Division and elsewhere.

Environmental Services Program (ESP)

[Supported with Section 106 and 319 Performance Partnership Grant (PPG) grant funds]

The Water Quality Monitoring Section (WQMS) of the ESP routinely conducts investigations that include monitoring of wastewater discharges and groundwater, electro-fishing and stream surveys. The WQMS also assists with special projects such as enforcement actions, environmental risk assessments, and damage assessments resulting from chemical spills. Staff are responsible for collecting and evaluating a wide variety of water, sediment, and aquatic macroinvertebrate samples. Find more information about work tasks conducted by the ESP at: http://www.dnr.mo.gov/env/esp/ and http://www.dnr.mo.gov/env/esp/esp-wqm.htm.

Annually, the Watershed Protection Section provides a work plan outlining the monitoring to be conducted by ESP for the development of a reference site network to characterize nutrient levels in wadeable streams. Summarized below is a general overview of the work plan:

1. Monitor twelve reference sites for: total nitrogen, ammonia nitrogen, nitrite plus nitrate nitrogen, total phosphorus, hardness, calcium, magnesium, sodium, potassium, bicarbonate, sulfate, chloride, flow, water temperature, dissolved oxygen, pH, and conductivity.
2. During high flow events when flow cannot be measured safely, an estimate of flow based on estimated width, depth and average velocity is made and denoted as an estimate rather than a measurement. All flow measurements or estimates are included in the field notebook and subsequently entered into the laboratory information management system (LIMS) database.

STATUS:
In FFY 2019, two new Quality Assurance Project Plans (QAPPs) were produced and seven QAPPs revised. The number of sites and frequency of monitoring across state fiscal years are adjusted as needed to allow for monitoring to be completed for nutrient criteria development and NPS monitoring requests for the TMDL program. Monitoring for TMDLs, 319/MRBI targeted watersheds, and NRCS/319 priority monitoring continued as planned. The University of Missouri-Columbia through annual cooperative agreements continue lake monitoring through the Lakes of Missouri Volunteer and Statewide Lake Assessment programs. All planned data collections through September 2019 are complete, and 2018 lake data is uploaded into the water quality assessment database for development of the 2020 integrated report.

Strategy b) Identify statewide water quality monitoring goals based on watershed priorities established through planning process.

STATUS:
The Missouri NPSMP was formally approved by EPA on September 30, 2015.

Strategy c) On a quarterly basis, catalog water quality data that has been internally reviewed for quality assurance into the state's Water Quality Assessment System (WQA) (http://dnr.mo.gov/mocwis_public/wqa/water bodySearch.do) and Biological Assessments Sampling Database (http://dnr.mo.gov/env/esp/Bioassessment/) and ensure water quality monitoring data are stored in EPA's STORET/WQX (Water Quality Exchange) compatible database as required by EPA. Data will be used for planning purposes.

STATUS:
Water quality data are uploaded via the Exchange Network as scheduled.

Strategy d) On a biennial basis, compile quality-assured water quality data for development of the Section 305(b) Water Quality Report and Section 303(d) list of Impaired Waters.

STATUS:

Water Quality Assessment Indicators of Progress

See Water Quality Monitoring, Assessment, and Standards at:
http://www.dnr.mo.gov/env/wpp/waterquality/

Water Quality Monitoring

The Department monitors water quality to:

- characterize background or reference water quality conditions;
- better understand daily, flow-event, and seasonal water quality variations and their underlying processes;
- characterize aquatic biological communities and habitats and to distinguish between the impacts of water chemistry and habitat quality;
- assess time trends in water quality;
- characterize the impacts of regional and local point and NPS discharges on water quality;
- check for compliance with water quality standards or wastewater permit limits and monitor the effectiveness of pollution control activities; and
- support development of strategies to return impaired waters to compliance with water quality standards.

The Department released an updated version of the Missouri 305(b) Integrated Water Quality Report in FFY 2018. See this report at:
http://dnr.mo.gov/env/wpp/waterquality/303d/303d.htm.
This report provides a summary of water quality in Missouri and assesses how well the waters of the state meet national Clean Water Act goals. The report also contains maps showing impaired waters in the state, the pollutants that affect them, and the sources of those pollutants.

Section 303(d) of the federal CWA (https://www.epa.gov/laws-regulations) requires each state to identify waters not meeting water quality standards and which have not required adequate water pollution controls. Water quality standards protect the designated uses of whole body contact recreation (e.g., swimming), fish and other aquatic life, and drinking water for people, livestock and wildlife. The 303(d) list (https://dnr.mo.gov/env/wpp/waterquality/303d/303d.htm) helps state and federal agencies keep track of impaired waters; those not yet addressed by water pollution control programs.

Currently, Missouri's NPSMP uses the 2002 303(d) List as a baseline for measuring progress. Thirty of the 223 impairments identified in that list are still impaired. Fifteen of those are due to mercury in fish tissue from atmospheric deposition. Four of the impairments have an EPA approved TMDL to address the impairment. One has a permit in lieu of a TMDL to address the impairment. See the remaining impairments in Table 4 below.

Table 4. Water Body/Pollutant Pairs on 2002 Missouri 303(d) List that are still on the 2018 EPA Approved 303(d) List or are still impaired with pollution control plans in place.

Row #	HUC 8	WBID	Name	Size	EPA Category	Pollutant	Source
1	07110002	7020	**Lewistown Lake***	35 acres	5	Atrazine	Rural NPS
2	10290106	1371	Brush Cr.	4.7 miles	5	Oxygen, Dissolved	Humansville WWTP
3	10300102	7388	Hough Park Lake	10 acres	5	Mercury in Fish Tissue	Atmospheric Deposition - Toxics
4	10300102	7436	Lake of the Woods	3 acres	5	Mercury in Fish Tissue	Atmospheric Deposition - Toxics
5	11010007	7326	Clearwater Lake	1,635 acres	5	Mercury in Fish Tissue	Atmospheric Deposition - Toxics
6	07110005	7033	Mark Twain Lake	18,132 acres	5	Mercury in Fish Tissue	Atmospheric Deposition - Toxics
7	10290108	1284	**Middle Fk. Tebo Cr.**	7.5 miles	4A	Total Dissolved Solids	AML - Coal Mining
8	10290108	1288	**Trib. M. Fk. Tebo Cr.**	3.1 miles	4A	Total Dissolved Solids	AML- Coal Mining
9	10290108	1288	**Trib. M. Fk. Tebo Cr.**	3.1 miles	4A	pH	AML - Coal Mining
10	11010007	2786	McKenzie Cr.	6.3 miles	4B	Oxygen, Dissolved	Piedmont WWTP
11	10300103	857	**Long Br.***	6 miles	4A	Cause Unknown	Source Unknown
12	11070207	3239	Clear Cr.	3.5 miles	5	Oxygen, Dissolved	Monett WWTP
13	11070207	3239	Clear Cr.	3.5 miles	5	Nutrient/Eutrophication Biol. Indicators	Monett WWTP
14	07110009	218	**Peruque Cr.***	10.9 miles	5	Aquatic Macroinvertebrate Bioassessments	NPS
15	10300101	420	**Indian Cr.***	3.4 miles	5	Escherichia coli	Leawood, KS WWTP, Urban Runoff/Storm Sewers
16	10290203	1455	Gasconade R.	264 miles	5	Mercury in Fish Tissue	Atmospheric Deposition - Toxics
17	07140103	2034	Bourbeuse R.	136.7 miles	5	Mercury in Fish Tissue	Atmospheric Deposition - Toxics
18	07140102	2184	Grand Glaize Cr.	4 miles	5	Mercury in Fish Tissue	Atmospheric Deposition - Toxics
19	07110002	7015	Deer Ridge Community Lake	39 acres	5	Mercury in Fish Tissue	Atmospheric Deposition - Toxics
20	11010007	2769	Black R.	47.1 miles	5	Mercury in Fish Tissue	Atmospheric Deposition - Toxics

Row #	HUC 8	WBID	Name	Size	EPA Category	Pollutant	Source
21	11010007	2784	Black R.	39 miles	5	Mercury in Fish Tissue	Atmospheric Deposition - Toxics
22	10300101	7097	Longview Lake	953 acres	5	Mercury in Fish Tissue	Atmospheric Deposition - Toxics
23	10300104	7469	Lake Buteo	7 acres	5	Mercury in Fish Tissue	Atmospheric Deposition - Toxics
24	11010011	2593	Eleven Point R.	22.7 miles	5	Mercury in Fish Tissue	Atmospheric Deposition - Toxics
25	07110008	189	Elkhorn Cr.	21.4 miles	5	Oxygen, Dissolved	Montgomery City East WWTF
26	11010006	7316	Noblett Lake	26 acres	5	Mercury in Fish Tissue	Atmospheric Deposition - Toxics
27	07140102	7280	Frisco Lake	5 acres	5	Mercury in Fish Tissue	Atmospheric Deposition - Toxics
28	11010001	7313	**Table Rock Lake***	41,747 acres	5	Chlorophyll-a	Municipal Point Source Discharges, NPS
29	11010001	7313	**Table Rock Lake***	41,747 acres	5	Nutrient/Eutrophication Biol. Indicators	Municipal Point Source Discharges, NPS
30	11010001	7313	**Table Rock Lake***	41,747 acres	5	Nitrogen, Total	Municipal Point Source Discharges, NPS

WWTF = Wastewater Treatment Facility; ***waterbodies** are eligible for §319 funding opportunities. The light grey colored rows are priority watersheds.

Water Quality Standards
See information on Missouri's Water Quality Standards (WQS) at:
http://www.dnr.mo.gov/env/wpp/wqstandards/index.html

The goal of the Clean Water Act is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. The first national set of water quality standards published in 1983 and codified in 40 CFR Part 131 allow individual states to construct their own water quality standards framework providing there is no reduction in protection compared to federal guidelines.

WQS are reviewed and modified every three years. Termed the triennial review process, the Department meets with the U.S. EPA, other state agencies, and concerned citizens to evaluate the effectiveness of Missouri's water quality standards and make appropriate changes.

WQS must meet a list of the narrative and numeric water quality criteria in order to support the designated uses assigned to water bodies in Missouri (http://www.dnr.mo.gov/env/wpp/wqstandards/wq_criteria.htm). The level of protection assigned to a stream, lake, or river is dependent on the attainable or existing "designated use(s)" of that waterbody. Classified waters in Missouri assigned the designated uses is listed in 10 CSR 20-7.031(c). The Antidegradation section requires actions to maintain existing uses and water quality.

The Department uses the frequency of WQS violations in identifying and characterizing waters of the state for purposes of compiling the 303(d) list and 305(b) report. In addition, effluent limits contained in NPDES permits are frequently derived using water quality standards (http://www.dnr.mo.gov/env/wpp/permits/).

The Department initiated a WQS review with the intent of addressing disapproved items (e.g., nutrient criteria for lakes), 304(a) criteria and other items. During FFY 2018, the Department worked with stakeholders to develop numeric nutrient criteria for lakes, for inclusion in its proposed amendments to Missouri's WQS regulation at 10 CSR 20-7.031. EPA approved the new regulations in December 2018[2].

Long-term Lakes Monitoring Programs (supported with Section 319 Grant funds)
Two important long-term lake monitoring efforts that provide data for the 303(d) and 305(b) reporting are below. The sponsor for both lake projects is the University of Missouri-Columbia.

- **Lakes of Missouri Volunteer Program Monitoring Network**
  (http://www.lmvp.org/)
  The University of Missouri-Columbia (UMC) partners with the Department in implementing the Lakes of Missouri Volunteer Program (LMVP). The goals of the LMVP are to:

[2] https://dnr.mo.gov/env/wpp/wqstandards/documents/nnc-12-14-18-epa-letter.pdf

1) determine the current water quality based on productivity or trophic state of Missouri's lakes, 2) monitor for changes in water quality over time, and 3) educate the public about lake ecology and water quality issues. A cooperative agreement with the UMC streamlines the lakes activities required by Section 314 and 319(h) of the Clean Water Act and 303(d) processes for lake water quality monitoring and assessments. The Department relies on UMC's lakes monitoring data to meet Section 303(d) reporting requirements and for the development of nutrient criteria. This cooperation also provides for prioritizing monitoring sites to benefit both parties and better meet both parties' needs and monitoring strategies.

The Department provided $159,367 in FFY 2018-2019 (April 2018-March 2019) and $180,324 in FFY 2019-2020 (April 2019-March 2020) for the LMVP network to meet the following objectives:

- Recruit new and/or retain existing volunteers and provide necessary sampling equipment and training for lake water quality monitoring. LMVP volunteers make approximately 650-800 site visits per year to collect water quality samples and measure the following parameters:
    - Total Nitrogen
    - Total Phosphorus
    - Chlorophyll
    - Inorganic Suspended Solids
    - Secchi Depth (or water clarity)
    - Microcystin
    - Cylindrospermopsin
- Conduct at least five side-by-side sampling events with volunteers to ensure quality of samples;
- Gather and analyze all samples from volunteers and publish results in the Annual Data Report (http://lmvp.org/lakes.htm);
- Conduct at least two regional data reviews for volunteers;
- Publish two newsletters per year with articles about NPS issues in Missouri.
- Produce approximately four web pages and conduct four limnology presentations for non-LMVP audiences; and
- Organize and/or provide supplies for no more than one snapshot-monitoring event, or obtain supplies and train volunteers to conduct blue-green algae testing as concerns arise.

- **Statewide Lake Assessment Project**
(http://www.lmvp.org/Waterline/fall2004/slap.htm)
The Statewide Lake Assessment Project (SLAP) began in 1978 and monitored lakes every year since 1989. This project produced one of the most complete, long-term studies of lakes in the nation. The data generated through the Statewide Lake Assessment helps the state meet Clean Water Act requirements for monitoring lake water quality, but more importantly, this information helps Missouri agencies identify water quality problems and better manage lakes. Also the Department uses these data for the 305(b) report and 303(d) list.

The Department provided $318,497 in FFY 2018-2019 (April 2018 – March 2019) and $208,252 in FFY 2019-2020 (April 2019 – March 2020) for SLAP to meet the following objectives:

- Increase the number of lakes that meet the data requirements for water quality assessments and add to the historic data set for a sub-group of Missouri reservoirs.
- Select lakes from the list of lakes provided in Appendix C and based on the criteria listed below:
  - The lakes will represent the full range of size, use, and geographical locations in Missouri. Monitoring will include 40 lakes considered of primary importance in the state; this list includes the largest lakes, representative lakes from each physiographic region, and those used extensively for recreation (e.g., Little Dixie). Continued sampling of these primary lakes provides a "statewide baseline" of water quality data allowing for the identification of large-scale regional trends.
  - Selection of 30 to 35 lakes from a secondary lake list (see Appendix C) for monitoring. Secondary lakes are selected on the basis of their existing water quality, sampling history (an effort is underway to get four summers of data on all classified lakes to allow for nutrient criteria assessment) emerging problems, and concerns expressed by state resource employees. This approach to annual sampling had input from a statistician. It provides flexibility in the annual sampling protocol, while serving as a cost-effective way of collecting and assessing water quality data for a large number of lakes and providing long-term databases.
- Generate data through the Statewide Assessment with limited data overlap gathered through the LMVP. The only primary lakes in SLAP also included in LMVP are the large multi-use ones. UMC will maintain monitoring on the large lakes due to their statewide importance for water supply, recreation, and tourism. LMVP does not duplicate some of the data collected from the large multi-use lakes by SLAP (e.g., water column profile data, dissolved organic carbon, turbidity, and conductivity). To avoid duplication of efforts, the LMVP lakes that are included on the SLAP secondary list will generally not be sampled unless a volunteer monitor is no longer available or there is an emerging problem.
- When requested, develop individual lake reports for Lake Associations or managing agencies.
- Sampling for algal toxins (Microcystin, Cylindrospermopsin, Anatoxin-a, and Saxitoxin)
- Conduct education and outreach efforts by contributing information to the Water Line Newsletter, Lake Association Data Reports, and conducting presentations on lake ecology and water quality.

Strategy e) Continue the success of the Stream Team and Volunteer Water Quality Monitoring programs by providing citizen opportunities to get involved in water resources issues by offering annual multi-level training, equipment for water quality monitoring, education workshops, supplies, trees for riparian corridor

restoration and networking of citizens within a watershed.

STATUS:
The Stream Team and Volunteer Water Quality Monitoring (VWQM) programs provide opportunities for citizens to get involved with water resource issues. Opportunities include training and equipment for water quality monitoring, educational workshops, supplies for litter pick-ups and storm drain marking, trees for riparian corridor restoration, and networking of citizens within a watershed. Two state agencies, MDC and the department, and a not-for-profit environmental organization, the Conservation Federation of Missouri, jointly sponsor the programs. There are currently 4,785 active Stream Teams, 4,919 trained water quality monitors and 90,000 citizens served by the program.

Staff provides workshops to the general public and Missouri Stream Teams to educate them about watersheds and NPS pollution and to train them to carry out water quality monitoring protocols as volunteers, focusing on Quality Assurance/Quality Control (QA/QC). Staff also: generates newsletters, publications, and training materials related to the program and water resource issues; works and consults with watershed groups; and serves as public contact for citizen participation in various water resources decision-making processes. The various levels of monitoring training are summarized below:

- Introductory Level - This is the basic level of monitoring that includes site selection, stream discharge and biological monitoring. The primary emphasis is education about watersheds, including NPS pollution, and the importance of biological monitoring. Citizens receive training in a workshop setting, then go to a nearby stream and collect macroinvertebrates (water quality indicator species). Subjects taught in the classroom and demonstrated at a nearby creek:
  - Biological Monitoring (Macroinvertebrates)
  - Site Selection
  - Watershed Mapping
  - Stream Discharge

- Level 1 – This workshop prepares volunteers to go to a nearby stream and investigate six chemical aspects of the water as well as conduct a visual survey of the site's physical characteristics, and reviews macroinvertebrate identification. The parameters measured include temperature, pH (the acidity/alkalinity of the water), conductivity, dissolved oxygen, nitrate (nutrient), and transparency. All six parameters relate to the Clean Water Act laws that protect the water quality of the nation's rivers and streams.

- Level 2 - Volunteers who have successfully completed a Level 1 workshop and submitted at least two seasons worth of Macroinvertebrates, Water Chemistry, Visual Survey, and Stream Discharge data, can attend a Level 2 workshop. The Level 2 workshop is a QA/QC Workshop in a laboratory setting. Volunteers receive a review of water chemistry and macroinvertebrates and then tested on their chemical analysis accuracy (against a standard and an unknown) and macroinvertebrate identification proficiency.

- Level 3 - Volunteers who have successfully completed a Level 2 workshop and submitted 12 sets of all 4 data types may ask for a Level 3 site audit with the VWQM QA/QC officer held in the field at their monitoring site. In order to pass a Level 3 audit, the volunteer must successfully demonstrate all of the procedures and techniques learned up to that point, as well as be proficient in identifying all of the invertebrates at their site to Order in the classification system.

- Level 2/3 Validation Training - All Level 2 (and above) monitors are required to attend a refresher training at least every 3 years (they may either retake Level 2 or attend a Validation workshop). This ensures that their equipment and reagents are all functioning properly and they are up to date on the newest methods and protocols used in the program. Replacement of chemicals, chemical kits, and other equipment occurs as necessary at this workshop and water chemistry monitoring methods tested. The volunteer must also pass an identification test on macroinvertebrates. Level 2 monitors who do not attend the required training will still have their data used, but at a lower QC level.

- Cooperative Stream Investigation (CSI) Training and Sampling Sessions - CSI allows the Stream Team Program to gain additional water quality information utilizing volunteer-collected samples for analysis by the State Environmental Laboratory within the department. Training for Level 2 or higher VWQM volunteers ensure knowledge to properly collect and handle samples according to the department's protocols. Data collected in this manner is of a high and documented quality, comparable to agency data, and can play an important role in the department's decision-making process relating to TMDL studies, permit evaluations, and for long-term resource studies. Due to budget issues, the department cannot sustain the laboratory analysis costs for a large number of projects. There were four ongoing CSI projects during FFY 2019 involving six volunteer participants and requiring five audits and twenty-five field visits for training, planning, sample collection, and reconnaissance.

- Advanced Monitoring Project (AMP) Training, Audit, and Field Visit Sessions - AMPs allow Level 2 and higher VWQM monitors the opportunity to engage in projects with a specific focus and purpose that require more advanced training and greater skill and commitment. In FFY 2019, there were no ongoing AMP's due to lack of volunteer interest.

The number of new Stream Teams formed in FFY 2019 was 191. These are comprised of 156 adult teams and 35 youth teams. Overall, the VWQM Program had 1,884 various activities involving 3,027 participants and 10,090 volunteer hours. See additional information about Missouri Stream Team and Volunteer Water Quality Monitoring programs at http://www.dnr.mo.gov/env/wpp/VWQM.htm and at www.mostreamteam.org.

Summarized below is the amount of data submitted to the Stream Team Program in FFY 2019 (see individual HUC-8 watershed descriptions and numbers by training level below in Tables 5 and 6) and the number of trainings held in FFY 2019 is provided in Table 7:

- Total data sheets received: 1,552
- Macroinvertebrates: 300
- Water Chemistry: 553
- Visual Survey: 291
- Stream Discharge 365
- Site Selection: 43 (used only for site mapping, not entered into VWQM database)

The number of newsletters developed by Stream Team staff included six bi-monthly newsletters.

- Missouri Department of Conservation's "Channels" newsletters, found at http://www.mostreamteam.org/newsletter.html.

Tables 5-7 show the most current compilations of Stream Team Activities.

Table 5. Stream Team Training Levels for FFY 2019 Data Submission by HUC

HUC8	Intro	Level 1	Level 2	Level 3	Level 4
07100009					
07110001					
07110002					
07110003				4	
07110004	4	2			
07110005					
07110006	**3**				
07110007					
07110008					
07110009		3			67
07140101	8	29	66	63	
07140102	**7**	**165**	**93**	**18**	
07140103		8	12		
01740104	**2**	**1**	**5**	**8**	
07140105	**2**	**4**			
07140107					
08010100					
08020201					
08020202	3		11		
08020203					
08020204					
08020302					
10240001					
10240004					
10240005	1	10			

HUC8	Intro	Level 1	Level 2	Level 3	Level 4
10240010					
10240011	**2**	**10**	**9**		
10240012	7	2	8		
10240013					
10270104					
10280101					
10280102					
10280103					
10280201					
10280202				8	
10280203		6			
10290102					
10290103					
10290104					
10290105					
10290106	**2**		**9**		
10290107	11		78		
10290108	11	2			
10290109		2			
10290110	**9**	**33**	**4**		
10290111		1	17		
10290201	5		3		
10290202		6	42	4	
10290203	8	33	4		
10300101	**11**		**7**		
10300102	**32**	**29**	**16**	5	
10300103		5	4		
10300104	2	2	3		
10300200	**13**	**16**	**103**	**55**	
11010001		4	10		
11010002	10	65	62		
11010003		35	26	15	
11010006	3	12			
11010007	6	6		7	
11010008	6	1	2		
11010009					
11010010					
11010011					
11070206			4		
11070207	**5**	**27**	**8**		
11070208					

Note: Priority watersheds are in bold.

Table 6. Stream Team Activities
(Values provided by MDC are for Calendar Year 2018; 2019 values are available April 2020)

ACTIVITY	PARTICIPANTS	HOURS	UNITS	VALUE*
Adopt-An-Access	7	7	7 agreements	$178.01
Advocacy	22	115	38 events	$2,924.45
Articles Written	8	11	8 articles	$279.73
ST Association Activities	238	1,174	47 events	$29,854.82
Award Winners	16	16	6 awards	$406.88
Display at Fairs, etc.	70	409	28 events	$10,400.87
Educational Projects	6,569	40,675	175 events	$1,034,365.25
Forestkeepers	22	118	18 trips	$3,000.74
Habitat Improvement	705	3,342	109 projects	$84,987.06
Invasive Species Monitoring	448	504	28 trips	$12,816.72
Letters Written	1	2	1 letter	$50.86
Litter Pickups	16,801	85,748	433 tons of trash	$2,180,571.64
Media Contacts	32	51	28 interviews	$1,296.93
Mentoring	66	126	21 projects	$3,204.18
Monofilament Recycling	36	62	28 ounces	$1,576.66
Meetings (held or attended)	1,031	3,020	1,168 attendees	$76,798.60
Other Miscellaneous Projects	644	2,281	147 projects	$58,005.83
Planted Trees	494	1,344	3,892 trees	$34,177.92
Pre-activity Planning	386	1,263	251 projects	$32,118.09
Photo Point Monitoring	51	66	69 photos	$1,678.38
Presentations to Other Groups	1,070	2,028	50 presentations	$51,572.04
Rain Garden/Barrel or Green Roof	25	65	9 projects	$1,652.95
Recruitment	44	60	50 people	$1,525.80
River Observation (possible pollution event)	4	14	3 projects	$356.02
Stream Access Maintenance	29	128	6 projects	$3,255.04
Storm Drain Stenciling	53	132	124 drains	$3,356.76
Streambank Stabilization Projects	2	2	1 project	$50.86
Watershed Mapping	2	2	1 inventory	$50.86
Workshops	376	3,157	394 attendees	$80,282.51
Water Quality Monitoring	3,216	6,893	891 trips	$175,288.99
TOTALS	**32,468**	**152,815**		**$3,886,085.45**

**$25.43/hour is the current national wage rate for the estimated value of volunteer time (U.S. Dept. of Labor). See additional information regarding the Stream Team activities at: http://mostreamteam.org/activities.html*

Table 7. Number of Volunteer Water Quality Monitoring Workshops Conducted Statewide.

VWQM Workshops	Number of Workshops	Number of Trained
Introductory Level	11	215
Level 1	6	58
Level 2	5	32
Level 3	1	1
VWQM Validation	4	26
Total	**27**	**332**

The Missouri Stream Team Annual Reports has additional information: http://www.mostreamteam.org/annual-report.html.

The Department uses some data acquired from certified volunteer monitors to:

a) Supplement agency-collected data for permitting purposes and to evaluate data submitted by the regulated community. The Water Protection Program's Monitoring and Assessment Unit uses this data for 305(b) preparation and 303(d) screening consideration.

b) Aid in identification of water quality problems. Conducted follow-up monitoring in FFY 2019 at one site each in Osage, Franklin, Phelps, and Boone counties to investigate the health of the macroinvertebrate community.

c) Provide supplemental data to local government entities and other agencies. In FFY 2019, the following entities received the data:

- The Department's Monitoring and Assessment Unit,
- The Department's TMDL/Modeling Unit,
- The Department's NE Regional Office,
- The Department's Section 319 NPS Program
- MDC,
- Ozarks Water Watch for inclusion in their Status of the Watershed report,
- Watershed and community groups, individual Stream Teams, and individuals.

Strategy f) Continue modeling efforts that support NPS TMDLs, which include spreadsheet models (e.g., load duration curves) and watershed scale models such as Hydrological Simulation Program – Fortran (HSPF) and the Surface Water Assessment Tool (SWAT). Modeling continues to support NPS bacteria and metals on the department's TMDL development schedule (http://dnr.mo.gov/env/wpp/tmdl/wpc-tmdl-progress.htm). Modeling staff continue to assist in the review and development of NPS load reduction models as requested for 319 grant projects.

Strategy g) Continue to develop TMDLs for water bodies not meeting Missouri's water quality standards due to NPS impairment.

STATUS:

TMDL Development (supported with Section 106 Water PPG and 319 PPG program funds), Section 303(d) of the federal Clean Water Act, and EPA regulations at 40 CFR Part 130 requires states to develop TMDLs for water bodies not meeting applicable water quality standards. The TMDL/Modeling Unit of the Water Protection Program develops TMDLs and facilitates public participation in reviewing TMDLs that address impaired water bodies found on Missouri's 303(d) list. TMDL development includes identifying all sources of the pollutant(s) of concern, calculating maximum pollutant load(s), assigning daily pollutant allocations to point and NPS, developing a margin of safety to account for uncertainty and addressing seasonality and TMDL implementation. Public participation includes public noticing all TMDL documents as well as responding to and resolving any public comments received on draft TMDLs. Public participation also includes the development and public noticing of supplemental TMDL implementation strategies documents, assisting with the formation of watershed groups and making staff available for TMDL public hearings and meetings.

EPA approved five TMDLs in FFY 2019 that addressed excessive *E. coli* loading with pollutant contributions from NPS. The TMDL/Modeling Unit also developed supplemental implementation planning documents for each of the approved TMDLs to provide additional information and guidance for how to achieve the TMDL allocations and loading targets. See these TMDLs listed below:

Water Body	WBID	Pollutant	Contributing NPS
Black Creek	0111	*E. coli*	Urban runoff / Septic systems
Black Creek	3825	*E. coli*	Agricultural runoff / Septic systems
Deer Creek	3826	*E. coli*	Urban runoff / Septic systems
L. Medicine Creek	0623	*E. coli*	Agricultural runoff /Septic systems
Medicine Creek	0619	*E. coli*	Agricultural runoff / Septic systems

The TMDL/Modeling Unit made available in FFY 2019 one revised TMDL and one supplemental implementation planning document for public review and comment. This TMDL addresses sediment and low dissolved oxygen impairments with some contribution and required reductions from NPS:

Water Body	WBID	Pollutant	Contributing NPS
Bear Creek	3960	Low DO Sediment	Agricultural runoff

There were four draft TMDLs and implementation planning documents under various stages of development during FFY 2019. Pollutants addressed vary and

include low dissolved oxygen, sediment, and *E. coli*. These water bodies include:

Water Body	WBID	Pollutant	Contributing NPS
Cedar Creek	1344	*E. coli*	Agricultural runoff / Septic systems
Stinson Creek	0710	Low DO Sediment	Agricultural runoff
Spring Creek	1870	Low DO Sediment	Agricultural runoff
Mound Branch	1300	Low DO	Agricultural runoff

During FFY19, TMDL/Modeling Unit staff also developed load duration curves and calculated needed load reductions for six impaired water bodies for use in development of 9-element WBPs. Pollutants addressed by these load duration curves include *E. coli*, sediment, and nutrients. The TMDL/Modeling Unit also completed GIS analyses and created supplemental maps to identify critical areas for implementation of BMPs. The water bodies for which this work was completed include:

Water Body	WBID	Pollutant
Brazeau Creek	1796	*E. coli,* TN, TP, and TSS
Cinque Hommes Creek	1781	*E. coli,* TN, TP, and TSS
Dry Fork	1792	*E. coli,* TN, TP, and TSS
Little Sac River	1381	*E. coli*
McClanahan Creek	1786	*E. coli,* TN, TP, and TSS
Omete Creek	1794	*E. coli,* TN, TP, and TSS

During FFY 2019, the Department continued implementation of the "Long-Term Vision for Assessment, Restoration, and Protection under the Clean Water Act Section 303(d) Program." The Department continues to integrate the Long-Term Vision into its TMDL/303(d) planning, to incorporate in future work plans and TMDL prioritization. Prioritization and scheduling for TMDL development is available at dnr.mo.gov/env/wpp/tmdl/wpc-tmdl-progress.htm. The Department is developing supplemental TMDL Implementation Strategies documents for each TMDL it develops and will public notice these plans with the TMDLs.

Participation in development of the "Long-Term Vision for Assessment, Restoration and Protection under the Clean Water Act Section 303(d) Program" included the following tasks:

- Participate in numerous national calls and webinars with EPA and ACWA related to this topic and update to the Assessment and TMDL Tracking and Implementation System, known as ATTAINS.
- Continue to develop and implement prioritization and schedule of TMDL development.
- Continue to implement measures in FFY 2019 such monthly/quarterly staff meetings to ensure greater coordination between 106 work plan language and the 319 PPG work plan language on TMDL development and submittal.

- Follow-up on approved TMDLs and document known implementation activities conducted to date. Upon review of this information, the Department prioritized watersheds in need of initial or additional implementation activities (i.e., BMPs, monitoring).
- Continue to assist 319 Unit with updates to 9-element WBPs to ensure inclusion of appropriate pollutant loading targets, estimate needed pollutant reductions, and identification of critical areas. Such updated plans may serve as TMDL alternatives consistent with the goals of the long-term VISION.

See additional information on Missouri TMDL development at: http://www.dnr.mo.gov/env/wpp/tmdl/wpc-tmdl-progress.htm.

Other TMDL outputs included:

- Coordination with NPDES program to implement TMDL Wasteload Allocations (WLAs).
- To ensure consistency with TMDL WLAs, TMDL/Modeling Unit staff continue to meet with permitting staff and review all draft NPDES permits for facilities located within and/or discharging to water bodies having been addressed in a TMDL.
- Staff continue to develop and maintain a spreadsheet and GIS data documenting TMDL implementation in state NPDES permits.
- Modeling of lakes proposed for inclusion on the 2020 303(d) list as impaired due to excess nutrients resulting from violations of the statewide numeric nutrient criteria for lakes. The purpose of the modeling is to estimate proportions of NPS vs point source loading, as well as to estimate potential pollutant reductions needed to attain water quality standards.
- Assist NPS staff with identifying potential 319 success stories, providing data, and reviews upon request.

GOAL II. Coordinate with federal, state, regional and local entities and stakeholder groups to assess water quality in NPS-impacted watersheds, vulnerable water bodies, or areas where additional information is needed within each HUC-8 watershed to support engagement, planning and WBP development and implementation efforts.

Objectives:

1. **Annually evaluate watersheds following the Missouri's Watershed Planning cycle to determine NPS impairments.**

Strategy a) Evaluation will be based on the "state of the watershed" characterizations.

STATUS:
(Supported by Section 106, 319, PPG, and other funding)

The Missouri's Section 319 NPS program will continue work with:

- Water Protection staff to schedule annual monitoring of watersheds in advance of watershed planning efforts or the development of TMDLs.
- Eligible entities to assist or provide available watershed information (water quality impairments/concerns, pollutant loads, and load reduction goals, etc.) for incorporation into 9-element WBPs. These plans also contain a schedule of milestones for the implementation of voluntary land management practices that address the water quality impairment.
- Partners to share watershed and water quality information.

2. Assist local communities and organizations in identifying priority watersheds and critical source areas of NPS pollution.

Strategy a) Collaborate with other partners that conduct watershed based water quality assessments.

STATUS:
The first step in implementing a watershed based project is developing a WBP that engages local and state partners. Assisting the communities in developing a WBP, the Department and NPS staff highly encourage as many partners as possible in the process to meet all needs and address concerns. Table 10 provides a status update of 9-element WBPs completed or in development in FFY 2019.

Strategy b) Identify watersheds in need of water quality data for assessing and prioritizing watersheds, including identification of NPS pollutants of concern, existing pollutant loads, water quality trends and critical source areas of NPS pollution.

STATUS:
As stated previously, the watershed framework continues to provide a mechanism for prioritization of NPS planning and implementation throughout Missouri. Through the framework, watershed characterizations provide a basis for priority-setting being completed for each HUC-8 watershed throughout the state. To date, 23 characterizations (watershed summaries and/or Healthy Watershed Plans) are complete for the following watersheds: Big, Independence-Sugar, Lower Grand, Lower Missouri, Lower Missouri-Crooked, Lower Missouri-Moreau, Meramec, Niangua, Sac, North Fork Salt, Salt, South Fork Salt, Spring River, and Upper Mississippi-Cape Girardeau. The status of these planning efforts are under Mid-Term Goal, Objective 1, Strategy g) of this document.

Strategy c) Support, through WBPs and voluntary implementation of conservation practices, NPS load reductions based on the Department's current approved TMDLs and TMDL development schedule.

STATUS:

Summary of FFY 2019 Project Evaluation Measures

Table 8 contains data compiled from information submitted by 319 subgrant project sponsors and reflects the activities conducted and load reductions achieved as part of their projects during this reporting period. This table represents a summary of results for all 319-related project activities in FFY 2019. Bar charts in Table 9 display the number of practices, acres impacted and cumulative reductions in sediment, nitrogen, and phosphorus for BMPs funded by both 319 grants and the Soil and Water Conservation Cost-Share Program. State cost-share through the Soil and Water Conservation Program (SWCP) supports TMDL activities throughout the state.

Table 8. Summary of 319 NPS Project Evaluation Measures.

Summary of FFY 2019 319 NPS Project Evaluation Measures

All 319 NPS Projects

Activities	Groups Formed	Meetings Held	Ave Attendees	Planning Documents Produced	Watershed Mgmt Plans W/ 9-elements	Watershed Mgmt Plans W/out 9-elements	Source Water Protection Plans Written	Other Plans (Watershed Based)
Planning	6	24	146	2	0	1	1	0
					acres	acres	acres	acres
					0	0	405,000	0

	TMDL Action Plans Written	TMDL Action Plans Implemented	BMP's Applied Toward TMDL's	TMDL Acres Treated	Stream Miles in compliance	Lake acres in Compliance
(Total Maximum Daily Loads)	0	0	1	0	0	0

	Field Days	Field Day Participants	Workshops	Workshop Participants	Demonstration Sites	Demonstration Site Participants	Brochures, Curriculums, and Factsheets Developed	Brochures, Curriculums, and Factsheets Distributed	GIS Maps/Shape Files Developed	Interactive Maps Created
Education/Information	20	600	14	747	9	216	1,010	6,774	6	0

	PSA's Produced	PSA's Aired	Newsletters Developed	Newsletters Distributed	Webpages Produced	Webpage Views	Clean-Up Events Conducted	Clean-Up Event Participants	Tons Collected at Clean-Up Events
Education/Information	13	24	40	57,664	81	10,374	5	557	12

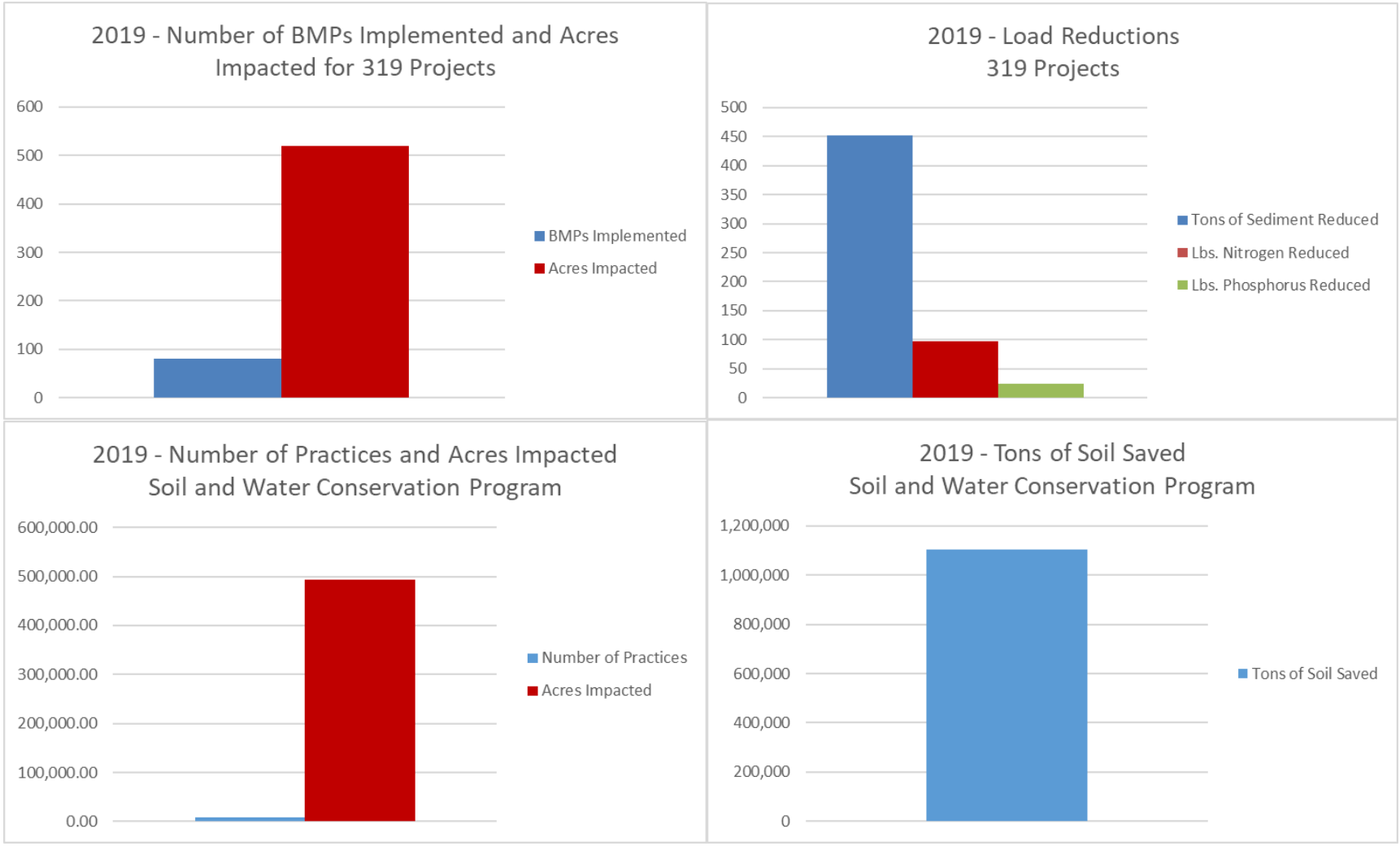
	QAPPs Produced	QAPP's Revised	Stream Teams Formed	Training Sessions Conducted	Volunteers Trained	Sampling Locations Monitored	Sampling Events Conducted	Water Quality Parameters Analyzed
Water Quality Monitoring	3	3	9	11	41	301	1,780	65

	Wells Plugged	Wells Monitored	Sinkhole/Karst Protection	Groundwater Remediation
Groundwater Protection	0	2	0	0

	BMP's Implemented	Acres Impacted by BMP's	Tons of Sediment Saved	Lbs. Nitrogen Reduced	Lbs. Phosphorus Reduced	Lbs. Pesticides Reduced	Other Load Reductions
(Best Management Practices)	81	519	452	98	23	0	0

	CNMP Developed	CNMP's Updated	CNMP's Implemented	Acres Impacted by CNMP's	Animals Impacted by CNMP's	Animal Waste Facilities Built	lbs of Manure Transferred Out
Agricultural	0	0	0	0	0	0	0

Table 9. Number of BMPs and Sediment, Nitrogen, Phosphorus and Pesticide Load Reductions by 319 Projects and the Soil and Water Conservation Cost-Share Program Reported for FFY 2019.



3. **Evaluate the condition of the state's waters bi-annually in the 305(b) Missouri Integrated Water Quality and 303(d) report as required by the CWA to determine: a) waters not meeting water quality standards due, at least in part, to NPS pollution, and b) the cause of the impairment or degradation.**

STATUS:
The 2018 303(d) list was approved by USEPA on August 30, 2019. The 2020 303(d) List is on public notice from November 15, 2019 through February 20, 2020. Both are available on the Departments website: (https://dnr.mo.gov/env/wpp/waterquality/303d/303d.htm). Missouri submits the 305(b)/Integrated Report to USEPA Region 7 with the submittal of the 303(d) List through USEPA's ATTAINS.

Strategies:

a) Ensure that monitoring procedures meet quality assurance requirements and are compliant with EPA Quality Management Plan policy.
b) Identify surface water bodies and aquifers that need additional information to characterize non-attainment of designated uses and water quality standards.
c) Conduct special studies when necessary to determine sources of NPS pollution and gain information to target water quality planning and BMP implementation.
d) Determine NPS load reductions and implement plans to restore water quality in water bodies identified as impacted by NPS pollution.
e) Conduct monitoring to determine effectiveness of load reduction studies, WBPs and best management and conservation practices implementation.
f) Utilize Missouri's data collected from the successful and effective Stream Team and Volunteer Water Quality Monitoring Programs in partnership with the MDC and Conservation Federation of Missouri.

STATUS:
Strategies a)-f) have been reported on in greater detail in other parts of this document. Collectively these are all part of evaluating the condition of state waters.

Strategy g) Increase use of water quality models [e.g., Agriculture Conservation Planning Framework (ACPF), Agricultural Policy Environmental eXtender model (APEX), SWAT] from pilot efforts to full implementation over period of the NPSMP to estimate NPS load reductions from implemented conservation practices at the field and watershed levels.

STATUS:
Agriculture Conservation Planning Framework – Uses spatial data on soils, land use, and topography combined with knowledge of conservation effectiveness to reduce nutrient discharge from small watersheds. The ACPF Toolbox software includes tools to process the LiDAR-based digital elevation models for hydrologic analysis, which then allows a series of prioritization, riparian classification, and conservation-practice placement tools to be used. These toolsets identify agricultural fields most prone to deliver runoff directly to streams, map and classify riparian zones to inform whole-watershed riparian corridor management, and estimates the extent of tile drainage in the watershed. The software maps out suites of locations appropriate to install each of several types of conservation practices. The practice-

placement opportunities are mapped for practices including controlled drainage, grassed waterways, water and sediment control basins, and nutrient removal wetlands. Rather than making any recommendations, ACPF provides an inventory of watershed assessment data and conservation placement opportunities across a watershed, in order to inform local watershed planning. NRCS is using the ACPF in several watersheds in Missouri and making it more specific to state conditions. Find more information at: https://acpf4watersheds.org/

Watershed based plans continue to incorporate information from other models such as SWAT and APEX, mainly written by university partners.

GOAL III. Implementation of nonpoint source loading studies, Watershed based Plans, source water protection plans and other state, regional and local plans/programs with various funding sources to reduce NPS pollution by targeting implementation activities to the areas identified as impacted, impaired, or potentially degraded.

Objectives:

1. **Support a watershed process that engages local leaders, technical experts, and citizens in setting local water resource priorities and defining next steps and actions to address those priorities.** (supported by non-federal funding)

   Strategy a) Fund five contracts a year for five years with the Missouri Association of Councils of Government (MACOG), Regional Planning Commissions and other qualified organizations for implementing comprehensive watershed planning, assessment, technical assistance, education and outreach and capacity building.

   STATUS:
   There were no new watershed summary documents developed since FFY 2018. However, the watershed summary documents completed are for the priority HUCs listed in the NPSMP and under the Mid-Term Goal, Objective 1, Strategy g) of this document.

   During FFY 2019, the Section 319 NPS Program contacted and/or worked with various entities to continue watershed-planning efforts within these areas. A summary of those efforts is included in the following summary status updates.

   During FFY 2019, Section 319 NPS grant funds supported the development of 9-element WBPs by the following sponsoring agencies:

   1) Watershed Committee of the Ozarks for the Sac Watershed (76-100% complete). The project end date is November 30, 2019.
   2) Schuyler County Soil and Water Conservation District for the North and Middle Fabius (51-75% complete). The project end date is October 31, 2020.
   3) Missouri State University for the James River Basin (26-50% complete). The

project end date is December 31, 2020. (previously supported with Section 604(b) grant funds)

4) Boone County for the Greater Bonne Femme (0-25% complete). The project end date is July 31, 2020.

Strategy b) Fund local watershed meetings; a minimum of 20 per year in the Missouri Watershed Planning focus watersheds**.**

STATUS:

Over the course of FFY 2019 NPS staff continued to work with the Watershed Protection Section and various watershed groups or non-profit 501(c)(3) organizations to develop both new and updated 9-element WBPs. Numerous informal meetings continued from FY2018 to discuss current and future watershed planning efforts for the Meramec, Cuivre, Lower Grand, and Niangua rivers 8-digit HUCs, the Lake Taneycomo subbasin and expanding the plan to include all the main subbasins for the Lake of the Ozarks. The Department's Watershed Protection Program prioritized work for the Town Branch and Piper Creek WBP to include the agricultural component. The TMDL/Modeling Unit is currently revising a TMDL for Town Branch and Piper Creek to address excess nutrient and sediment loading in those water bodies. Nonpoint source loading targets in the TMDL are load allocations for total nitrogen, total phosphorus and total suspended solids. These allocations are to inform the WBP. Updating the WBP is in lieu of development of a supplemental TMDL implementation planning document, but will incorporate much of the same information (e.g., critical areas, needed reductions, loading targets, etc.) and available during FY2020.

Watershed based planning discussions continue in the Perry County Karst watershed under local funding opportunities. The WBP is approximately 80 percent completed. One Perry County Karst partners held meetings during FFY 2019 (June 2019) to discuss the plan and the management practices needed to address the water quality concerns related to the water quality impairments and for the protection of the Grotto Sculpin (endangered fish species) and to tour the area. There is interest in updating the WBP to include current status of the water quality conditions, modeled pollutant loads, modeled target loads, and identification of critical areas for the implementation of management practices that address the water quality concerns. The Department is finishing water quality data collection efforts for bacteria in the streams currently listed as impaired for E. coli. The TMDL/Modeling Unit developed *E. coli* load duration curves and identified critical areas for inclusion in the Perry County watershed plan. Additional nutrient and TSS load duration curves are currently under development. Summarized below are completed load duration curves:

Water Body	WBID	Completed Load Duration Curves
Brazeau Creek	1796	*E. coli,* TN, TP, and TSS
Cinque Hommes Creek	1781	*E. coli,* TN, TP, and TSS
Dry Fork	1792	*E. coli,* TN, TP, and TSS
McClanahan Creek	1786	*E. coli,* TN, TP, and TSS
Omete Creek	1794	*E. coli,* TN, TP, and TSS

2. Assist qualified organizations with funding and technical support in developing or updating WBPs to meet requirements of 9-element WBPs or acceptable alternative watershed plans.

Strategy a) Contract with universities or other qualified organizations to develop two new HUC-8 WBPs that identify critical source areas of priority HUC-12 watersheds and catchment basins and target systems of conservation practices for achieving NPS pollutant load reduction goals in the next five years.

STATUS:
See status of Strategy a) and b) under Objective 1 above.

Strategy a) Update existing watershed plans, as needed, to obtain EPA acceptance as 9-element WBPs or acceptable alternative watershed plans. Please reference Table 10 for additional information.

Strategy b) Update existing watershed plans, as needed, to obtain EPA acceptance as 9-element WBPs or acceptable alternative watershed plans. Please reference Table 10 for additional information.

STATUS:
Watershed based planning subgrants were previously awarded to produce 9-element WBPs in watersheds with Section 303(d) listed NPS impairments. In accordance with the revised 319 Grant Guidance approved in April 2013, EPA is working more closely with states to ensure WBPs are adequate. Therefore, beginning in 2014, EPA regions were to annually review a sample of WBPs from each state in their region and provide feedback and recommendations to help ensure these plans provide a good foundation for efforts to restore and/or protect waters. Each EPA region has the discretion to determine the appropriate number of plans to review each year. EPA regions are encouraged to review draft WBPs under development, particularly where 319 funds support plan development. EPA Region 7 has elected to review all of Missouri's WBPs to ensure the plans are meeting the 9-elements before they accept the plans and implementation of those plans with federal grant funds.

EXISTING WATERSHED BASED PLANS:

Within the new 319 Guidance revised in 2013, EPA Regions were tasked with ensuring the states update any WBPs that are older than five years. The following list shows the previously accepted priority WBPs in need of updates or revisions, with Group 1 watershed plans, being the highest priority.

Table 10 below provides the current schedule and status for updating WBPs during FFY 2019.

STATUS:
Reporting the status of the watershed plan developments is by 0-25%, 26-50%, 51-75%, and 76-100% completion.

Group 1 watershed plans located within Missouri's priority watersheds with an approved TMDL and active 319 grant projects:

1) Spring River (HUC 8) (EPA accepted with Addendum) (Status:100% complete)
   NPS TMDLs in the Spring (HUC#11070207):
   - Lamar Lake - nutrients
   - North Fork Spring River – sediment
   - Shoal Creek – bacteria
   - Shoal, Pogue and Joyce Creeks - bacteria
2) North and Middle Fabius (Status: 76-100% complete)
   NPS TMDLs in North Fabius (HUC# 07110002)
   - North Fabius River - sediment
3) Little Sac (includes Fulbright Spring and Fellows-McDaniel Lake) (Status: 76-100% complete)
   NPS TMDLs in the Sac (HUC#10290106)
   - Little Sac River – bacteria
   - McDaniel Lake - algae
4) Hinkson Creek (preliminary discussions with county have occurred)
   NPS TMDLs in Lower Missouri-Moreau (HUC#10300102)
   - Cedar and Manacle Creek – low pH
   - Hinkson Creek – stormwater runoff/unknown
   - Kelly Branch – sediment
   - Rocky Fork - sediment
5) Lower Meramec River (includes Kiefer Creek and Fishpot Creek) (Status: EPA accepted Keifer Creek portion with conditions. Updates to the other subwatersheds – 0-25% complete). Fishpot creek has water quality monitoring being conducted, with and water quality monitoring scheduled in SFY 2021 for Mattesse Creek to support updates to the plan.
   NPS TMDLs in the Meramec (HUC#07140102)
   - Fishpot Creek – bacteria

Not currently in priority area, but have an approved TMDL developed and active 319 projects:

1) Table Rock Lake (Eastern & Western)(preliminary discussions with a local organization have been initiated)
2) James River (Middle James, Finley & Ward Branch) (Status: Wilsons Creek – 76-100% complete)
   NPS TMDLs in the James River (HUC#11010002)
   - James River – nutrients
   - Jordan, Pearson, Wilson Creek – stormwater runoff/unknown

Group 2 watershed plans in priority watershed, with or without an approved TMDL or current 319 projects:

1) Lake of Ozarks (Niangua Arm)

2) Perry County Commission Conservation (Karst) (Restoration and Protection Plan) (Status: 76-100% complete)
3) Watkins Creek
4) Marais des Cygnes, Little Osage, Marmaton River
5) Bonne Femme (Status: 0-25% complete)

Group 3 watershed plans not currently in priority watershed, but have an approved TMDL and no 319 project:

1. Elk River
   NPS TMDLs in the Elk River (HUC#11070208)
   - Big Sugar, Buffalo, Indian, Little Sugar, Middle Indian, North Indian, Patterson, and South Indian Creeks, and Elk River - nutrients
2. Town Branch (Status: prioritized for review)
   NPS TMDLs in the Pomme de Terre River (HUC# 10290107)
   - Town Branch and Piper Creek - sediment
3. Jacks Fork
   NPS TMDLs in the Current River (HUC#11010008)
   - Jacks Fork River - bacteria

Group 4 watershed plans not addressing an impaired water body or state resource water:

1) Sandy Creek
2) Belews Creek
3) Smithville Lake (delisted during the 2002 303(d) listing cycle)
4) Spring Fork Lake
5) Brush Creek Mid-shed
6) Higginsville Lake (Higginsville South Lake was delisted during the 2004 303(d) listing cycle)
7) Dry Branch a tributary of McCoy Creek, delisted during the 2018 303(d) listing cycle, and McCoy Creek submitted to and accepted by EPA as Missouri's FFY 2019 Nonpoint Source Success Story

EPA has determined the following WBPs eligible for partial funding with 319 grant funds:*

- Black Creek (Status: project on hold until new project sponsor is found)
- Deer Creek (Status: active 319 project)
- Lake Ozarks (Buck Creek and Lick Branch) (Status: active 319 project)
- Spring River (Status: active 319 project)
- Lower Meramec River (Status: active 319 project)

** See a summary of the project efforts in Appendix D.*

Table 10. Schedule and Status for Updating WBP.

Watershed–Based Plans	Targeted Schedule	Status
Updating **Lower Meramec River WBP** to include: Kiefer Creek WBP Fishpot Creek Stream Study Plan	Completed EPA accepted with conditions	Department gathering additional information for the Fishpot and Mattese subwatersheds.
Little Sac River WBP – updating to include: Fellow-McDaniel Lake and Fulbright Spring WBPs	November 2019	In progress by the Watershed Committee of the Ozarks
James River – HUC 8	December 2020	In progress by the Southwest Missouri Council of Governments
Middle James River-Wilson Creek WBP – updating to be a current plan.	Completed EPA accepted	319 NPS implementation project in process
Deer Creek WBP – updating to expand the targeted/critical areas and include additional subwatersheds (increase from 3 to 5).	Major update scheduled in FFY 2020	
North and Middle Fabius – updating to fully address the 9-elements. Ground-truthing planned to identify land use changes and current nonpoint source problems.	October 2020	In process by the Schuyler County SWCD and University MO Extension
Niangua Arm Lake of the Ozarks - updating to fully address HUC12 watersheds. Revisions will include identifying critical /target areas, determining pollutant load reduction targets and BMP implementation measures in the agriculture areas.	Update: TBD	Proposed: All four 12-digit HUCs will be included in the Lake of the Ozarks WBP update.
Town Branch – Update Element A (critical areas for agricultural areas need more detail)	WBP Update scheduled for FFY 2020	Department gathering additional information to address the missing planning elements.
Perry County Commission Conservation (Karst) Alternative Plan Updating to include implementation	Discussions continue, TBD	To be determined Update: in progress by the MDC (76-100% complete).

Watershed–Based Plans	Targeted Schedule	Status
schedule, load reduction targets identified, critical areas identified		
Watershed–Based Plans	**Targeted Schedule**	**Status**
Alternative or Protection Plans	One per year – order to be determined	TBD

3. **Prevent and reduce NPS pollution loading in surface water bodies, groundwater aquifers and wetlands through WBPs, the state's Monitoring Strategy and other state, regional and local plans.**

Strategy a) Develop and implement voluntary best management and conservation practices in water bodies and watersheds identified as impacted/impaired by NPS pollution.

STATUS:
See load reduction data in Goal II, Objective 2, which includes both the 319 and Soil and Water Conservation Program load reductions.

Strategy b) Work with regional and local entities to determine priority areas, and develop and implement strategies to address NPS pollution in those areas.

STATUS:
See Goal III, Objective 1.

Strategy c) Support necessary noncompetitive, program-critical subawards using contractors (estimate 2 per year) in order to facilitate development of high quality WBPs; implement important monitoring, assessment and project auditing/inspection activities; and improve targeting of high priority conservation practices in critical source areas.

STATUS:
The Department is collaborating with various entities to develop WBPs within priority areas of the state, such as the Lower Grand, Cuirve, Table Rock Lake and Sac

4. **Increase protection of public water supply sources through the implementation of source water protection plans.**

Strategy a) Work with local public water suppliers to complete and initiate implementation of source water protection plans.

Source Water Protection

See Public Drinking Water information at: http://dnr.mo.gov/env/wpp/dw-index.html

Strategy b) Continue working cooperatively with the Missouri Rural Water Association and other organizations for planning support and technical assistance to local public water suppliers to develop plans.

Public Drinking Water's - Capacity Development Annual Implementation Report

The Safe Drinking Water Act's (SDWA) capacity development provisions provide a framework for states and water systems to work together to ensure that systems acquire and maintain the technical, managerial, and financial (TMF) capacity needed to meet the SDWA's objectives for public health protection. In 1998, the Department, with the assistance of the Capacity Development Strategy Advisory Committee, developed the first Missouri Capacity Development Strategy (Strategy). EPA approved the Strategy in 2000. In 2004, the Department made minor revisions to the Strategy and in 2013, staff initiated an assessment of and further revisions to the Strategy. The Department continues to assess the state's Strategy periodically to ensure its success.

The Strategy is available on the Department's Capacity Development webpage and is comprised of 10 elements:

- Improve water system knowledge of current and future statutes and regulations.
- Improve communication and trust among all partners.
- Provide Missouri citizens and drinking water systems with education regarding the importance of safe drinking water.
- Encourage partnerships between agencies and systems.
- Improve interagency and intraagency communication for TMF capacity related programs.
- Coordinate capital resources.
- Continue rate setting and financial management training for small systems.
- Increase planning in rural areas.
- Develop and provide board member training and TMF capacity materials and training to public drinking water system decision makers.
- Continue to collect baseline data to measure the success of TMF capacity activities.

MEASURES:

Operator Certification Measures

Certified operators perform daily operational activities that serve to protect public health and the environment. An operator certification program ensures operators possess the knowledge, skill, and ability as well as attend ongoing training to maintain certification and stay current with new regulations and emerging technologies.

The Department's Operator Certification Section provides for the training, examination, and certification of drinking water treatment, drinking water distribution, wastewater treatment,

and concentrated animal feeding (CAFO) operators. The Section issues, renews, deactivates, suspends, and revokes certificates according to state regulations. At the end of the FFY 2019, there are 167 active CAFO operator certifications and 2,865 wastewater treatment certifications. The Department submits an annual Operator Certification Program Report to the U.S. Environmental Protection Agency that highlights Missouri's efforts related operator certification. Detailed information is available in the report.

System Assistance and Training Measures – Technical Assistance Providers
In FFY 2019, the Department contracted with technical experts from MRWA, also known as circuit riders, to assist public drinking water systems facing technical, managerial, and financial (TMF) capacity challenges. The circuit riders provide assistance for water loss, rates and reserves, treatment, disinfection, asset management, distribution mapping, natural disasters, operator certification, and source water protection. Circuit riders focus their efforts primarily on systems that have difficulty obtaining resources to achieve and maintain TMF capacity. During assistance visits, circuit riders often address more than one issue encountered at the system.

During FFY 2019, circuit riders provided 282 onsite and offsite assistance visits to 163 systems statewide. Requests for circuit rider assistance with water loss and financial assistance outpaced all other TMF capacity requests. In FFY 2019, 72 percent of the assistance provided was technical in nature, while managerial and financial assistance efforts were 7 and 21 percent, respectively.

EPA Training and Technical Assistance for Small Systems Grant
Missouri Rural Water Association (MRWA)
The Department collaborated with MRWA to provide training and technical assistance to Missouri water systems with a variety of compliance-related issues, including disinfection by-products and revised total coliform rule. MRWA conducted 85 outreach and assistance visits, resulting in approximately 76 hours of onsite and 18.5 hours of offsite technical assistance to water systems. MRWA also provided 124 hours of formal training. Formal training included five distribution system components and concepts classes, five monitoring and managing a distribution system classes, three drinking water regulations update classes, and one pump station maintenance and troubleshooting class.

Midwest Assistance Program (MAP)
The Department met with MAP to discuss priorities for training and technical assistance to public water systems. Additionally, the Department and MAP worked on improving coordination when the Department requested MAP staff submit monthly reports on activities assisting water systems in Missouri. MAP conducted one training for small system operators and one training for board members and clerks during FFY 2019.

Environmental Finance Center (EFC)
The Department collaborated with EFC to provide two capital improvement planning workshops to 37 attendees. The EFC workshops provided attendees with information about managerial and financial topics such asset management, planning for upgrades, project funding, and communicating with board members.

System Assistance Measures – DNR Regional Offices
The Department's regional office personnel provide assistance to regulated systems [community (C), non-transient non-community (NTNC), and non-community (NC)] to help

them achieve and maintain compliance with applicable laws and regulations. Regional office efforts include assistance with permitting, monitoring, record keeping, and reporting. In addition, regional office personnel provide recommendations on system operations and potential cost saving measures. Most importantly, systems are encouraged to ask questions increasing communication and transparency between the regional office and regulated party. During FFY 2019, the regional offices conducted over 900 inspection related efforts and over 4,700 non-inspection related efforts

GOAL IV. Promote NPS education and outreach throughout the state.

Objective:

1. **Conduct education and technology transfer activities to increase awareness of NPS pollution and that contribute to the degradation of water bodies, including aquifers, by NPS pollution.**

Strategy a) Promote use of NPS educational materials to address NPS issues identified by local stakeholders.

Strategy b) Document the efficacy of education materials based on behavior modifications within the watershed and other appropriate measures and be reported through stakeholder progress reports and in grant reports from the Department required by EPA.

Strategy c) Conduct and support statewide and priority watershed-related NPS information, education and outreach efforts such as Project WET (Water Education for Teachers) and/or similar proven programs either through the department directly or through subaward agreements with stakeholders and reported in progress reports.

STATUS:

Section 319 NPS projects are required to include an NPS outreach component as part of their project efforts. Table 8 provides counts of the types of outreach efforts completed during FFY 2019.

Strategy d) Department and partner presentations on NPS-related topics annually at various water related forums, meetings and conferences.

STATUS:

Water Protection Forum

The Water Protection Forum initiated in May 2005 as a means of involving stakeholders in water quality policy discussions. The Water Protection Forum facilitates input and discussion from a wide diversity of interests, including agriculture, municipalities, industry, environmental groups, consultants, attorneys and others. The Water Protection Forum meetings are open to the public, which gives the public an opportunity to address Department and other agencies on specific water quality concerns. The Forum may also assist in the coordination and implementation of watershed protection strategies.

Members of the NPS Unit presented or attended the Water Protection Forum meetings during FFY 2019. The nonpoint source-related issues addressed at Water Protection Forum meetings during the last fiscal year:

- **December 11, 2019:** Mollusk Survey, site specific criteria, and revisions to WQS criteria and review
- **February 13, 2019:** Triennial review survey, lake modeling, nutrient TMDLs, lake numeric criteria, and monitoring and assessment.
- **May 7, 2019:** Nutrient trading, WQS rulemaking, 319 NPSMP updates, flooding updates, and nutrient loss reduction strategy
- **August 8, 2019:** Triennial review, nutrient trading, WQS implementation, 319 RFP proposal, TMDL amendments, operation certification updates, and Table Rock Lake water quality assessment.

Due to the many complex issues presented at the Water Protection Forum meetings, several advisory groups formed to work on selected issues. These subcommittees include:

Current Advisory Groups

- Affordability Subcommittee
- Chapter 2, Definitions
- Chapter 4 (Clean Water) and Chapter 13 (Drinking Water) Grants and Loans Workgroup
- Chapter 6, Permits Stakeholder Workgroup
- Chapter 7.015, Effluent Limitations
- Chapter 8, Wastewater Design Guide Revisions
- Operator Certification (Drinking Water, Wastewater, and Concentrated Animal Feeding Operation (CAFO))
- Clean Water Fees
- Construction and Operating Permits Workgroup
- Nonpoint Source Management Plan Revisions
- Sanitary Sewer Overflow
- Section 401 Water Quality Certification Rulemaking Subcommittee
- Water Quality Standards Workgroup
- Additional Environmental Workgroups and Forums
- Antidegradation Implementation Procedures

See future meeting information and presentations from previous meetings on the Department's website at http://www.dnr.mo.gov/env/wpp/cwforum/index.html.

Strategy e) Maintain a NPS website that provides information, references and web links that inform, educate and assist watershed partners with ongoing watershed efforts. Document the annual numbers of NPS webpage updates and webpage hits, reporting the frequency and use of the website in the annual grant program performance reports to EPA.

STATUS:

The Department has a website http://dnr.mo.gov/education/index.html with an extensive collection of education materials related to watersheds, 319 education projects, stream team

information, and educator education. Also available are numerous publications and fact sheets on the Department's website https://dnr.mo.gov/pubs/ related to water pollution control, stormwater, wastewater, conservation practices, and much more.

Some popular projects and websites developed through 319 funded projects that continue to promote nonpoint source and water quality are:

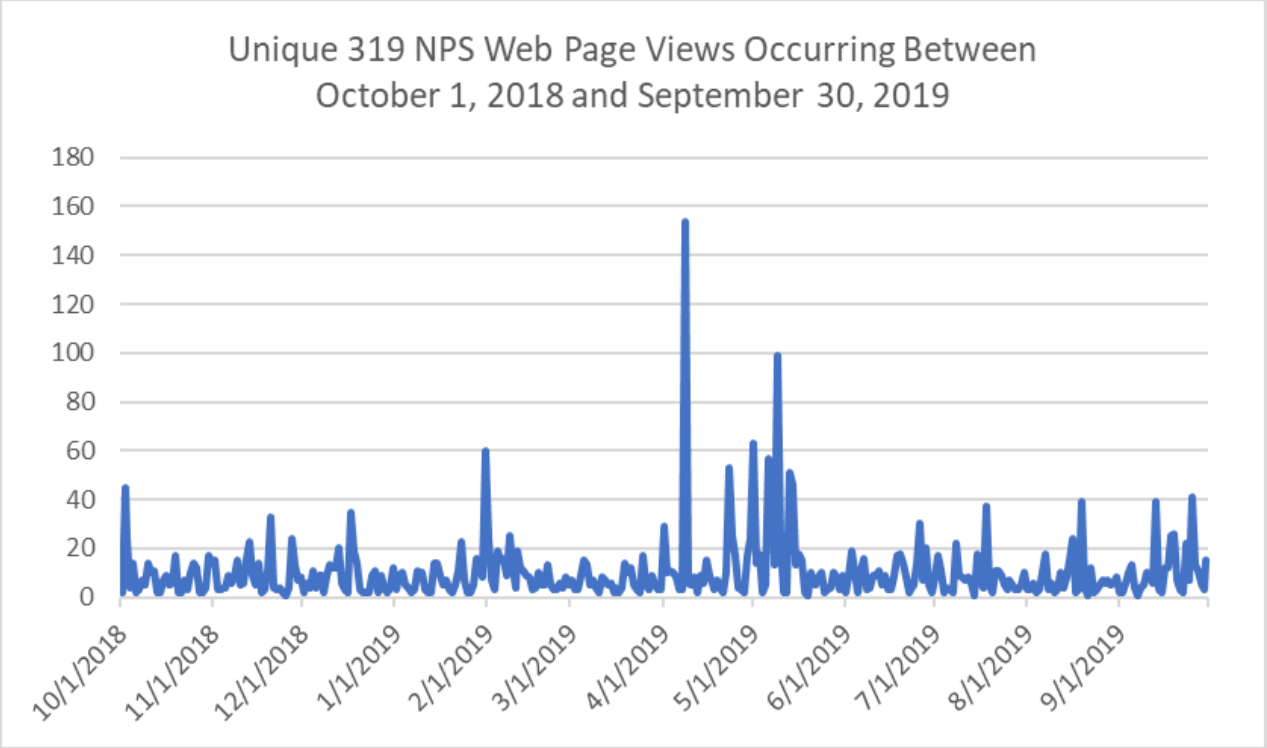
- Operation Brightside in St. Louis (http://brightsidestl.org)
- James River Basin Partnership (http://jamesriverbasin.com)
- Missouri Stream Team Watershed Coalition (http://mstwc.org)
- Stream Teams (http://mostreamteam.org)
- Watershed Committee of the Ozarks (https://watershedcommittee.org/our-publications/)
- Little Creek Nature Area – Ferguson Florissant School District (https://www.fergflor.org/domain/68)
- HEC T.V. (https://hecmedia.org/posts/a-sewer-runs-through-it/)

The Department also maintains a website specific to NPS information (http://dnr.mo.gov/env/wpp/nps/index.html) related to applying for grant funding, the NPSMP, Missouri's Mission of the Nonpoint Source Program, project examples, project photos, etc. Table 11 and Figure 1 provide a summary and frequency of the webpage hits occurring during FFY 2019.

Table 11. Section 319 NPS Web Page URL Counts of Views

Web Page URL	Page Views
https://dnr.mo.gov/env/swcp/nps/	1919
https://dnr.mo.gov/env/swcp/nps/319projectexamples.htm	184
https://dnr.mo.gov/env/swcp/nps/319nps-proj-req.htm	649
https://dnr.mo.gov/env/swcp/nps/319overview.htm	161
https://dnr.mo.gov/env/swcp/nps/319applicationresourcetools.htm	167
https://dnr.mo.gov/env/swcp/nps/319nps-minigrant.htm	147
https://dnr.mo.gov/env/swcp/nps/319annualreport.htm	90
https://dnr.mo.gov/env/swcp/nps/watershedbasedplanning.htm	189
https://dnr.mo.gov/env/swcp/nps/nps-photos.htm	69
https://dnr.mo.gov/env/swcp/nps/mgmtplan/index.html	67
Total Webpage Hits	**3663**

Figure 1. Section 319 NPS Web Page Hits



Strategy f) Collaborate with partners to assist with watershed and water quality outreach, education and information, technical assistance and other NPS water quality issues consistent with this plan.

STATUS:

Watershed based Planning:

Through sub-agreements, the below projects are fully or partially funded during FFY 2019 with Section 319 grants to assist the Department with planning efforts that include outreach and technical assistance.

1. **Schuyler Soil and Water Conservation District** – Updating the North and Middle Fabius watershed to address the water quality impairment and implement the TMDL.
2. **Boone County** – Developing a 9-element WBP to address water quality concerns in the Bonne Femme and Little Bonne Femme watersheds.
3. **Watershed Committee of the Ozarks** – developing a 9-element WBP in the Upper Little Sac watershed to address the *E. coli* impairment.

Implementation of Watershed based Plans:

Through sub-agreements, the below projects are fully or partially funded during FFY 2019 with Section 319 grants to implement EPA-accepted WBPs that include outreach and technical assistance.

1. **James River Basin Partnership** – Implementing the management practices in the Wilsons Creek watershed.

2. **Lake of the Ozarks Watershed Alliance** – Implementing practices in the Lake of the Ozarks in two priority 12-digit HUCs located at the Lake of the Ozarks.
3. **Missouri Botanical Gardens** – Implementing practices within the Deer Creek watershed.
4. **The Nature Conservancy** – Implementing practices within the Shoal Creek located within Spring River watershed.

Statewide Volunteer Monitoring and Regional Demonstration Projects:
Through sub-agreements and cooperative agreements, the below projects are fully or partially funded during FFY 2019 with Section 319 grants which include outreach and technical assistance.

1. **The Stream Team and Volunteer Water Quality Monitoring Programs** - to provide stream monitoring training to citizen volunteers in the collection of chemical, physical, and biological water quality data across the state. (See more details in Short-Term Goal I, Objective 1.) Find more information about the Missouri Stream Team and Volunteer Water Quality Monitoring Program at: http://mostreamteam.org/
2. **Lakes of Missouri Volunteer Monitoring Program** – to provide lake monitoring training to citizen volunteers in the collection of chemical and physical water data across the state. Find additional information about the Lakes of Missouri Volunteer Program at: http://www.lmvp.org/
3. **Missouri Corn Merchandising Council** – to conduct farm scale edge-of-field agricultural runoff monitoring of nutrients and sediment to study the effectiveness and demonstrate benefits of agricultural conservation practices and to support water quality effort aimed at meeting state soil and water stewardship goals.
5. **Harry S Truman Coordinating Council –** to implement the Spring River WBP by engaging riparian landowners and community leaders and promote public awareness in the Spring River watershed.

Strategy g) Provide NPS educational materials and outreach at water quality events.

STATUS:
See Strategy i) below.

Strategy h) Provide or share NPS educational materials or web links to materials developed under grant funded subawards.

STATUS:
NPS and SWCP staff provide educational material and web links to organizations they work with, and these materials are available on the NPS webpage (https://dnr.mo.gov/env/swcp/nps/).

Strategy i) The Department will annually participate in at least four water quality events to:
- Provide educational materials and information about the NPS Program and available Section 319 project funds.

STATUS:
Department staff funded through the 319 program are responsible for promoting, implementing and reporting progress of subgrant projects. Staff also perform activities not directly associated with a grant project such as providing input and direction on a wide variety of water quality related issues that are priorities for the Department.

The NPS staff are active participants in stakeholder meetings and nonpoint source events. Staff participated in conferences and meetings, giving presentations as requested, and setting up displays at a variety of venues throughout the state to provide awareness about 319 NPS grant opportunities and disseminate information to those interested in addressing NPS problems. The following are a few examples of exhibits, festivals, workshops, meetings, training, and other events that staff attended in FFY 2019.

1) Missouri Association of Soil & Water Conservation Districts Annual Conference
2) Annual Booth at the Missouri Natural Resources Conference
3) Regional Envirothons
4) State Envirothon
5) Earth Day – Missouri State Capitol
6) Missouri Association of Soil and Water Conservation Districts Area Meetings
7) National Association of State Conservation Agencies Annual Meeting
8) National 303(d)/TMDL Vision Meeting – West Virginia
9) Bimonthly Section 319-unit project meetings
10) Soil and Water Districts Commission Meetings
11) Clean Water Commission Meetings
12) Water Protection Forum
13) Quarterly Wetland Coordination Meetings
14) Perry County Karst Partners Meetings
15) Meramec Partners Meetings
16) OneStL Partners Meetings
17) Niangua Watershed Planning
18) Locus Creek Feasibility Study
19) East Fork Locus Creek Watershed Planning
20) Cuivre River Watershed Planning
21) Lake Tanycomo Watershed Planning
22) Lower Grand Watershed Planning
23) Nutrient Loss Reduction Strategy
24) Nutrient Trading
25) 2020-2025 Nonpoint Source Management Planning
26) City of Frontenac
27) City of Brentwood
28) Kiefer Creek Castlewood State Park
29) Big Oak Tree State Park
30) EPA meetings:
    - GRTS Leverage Meetings
    - GRTs training
    - Region 7 – 4 State Meeting in Prairie City, Iowa
    - Region 7 – 4 State Annual Water Quality Partners Meeting

- Kansas Governor's Conference on Water

31) Section 319 Project related meetings or site visits included:
    - Lakes of Missouri project meeting
    - Lake of the Ozark Watershed Alliance
    - Missouri Botanical Gardens
    - Missouri Lakes Monitoring Programs
    - Harry S Truman Coordinating Council
    - Boone County
    - Watershed Committee of the Ozarks
    - James River Basin Partnership
    - Missouri Corn Merchandising Council and Soybean Association
    - Deer Creek Watershed Alliance 10-Year Celebration

In total, the Soil and Water Conservation Program staff attended over 45 NPS related meetings, public events, exhibits and festivals during FFY 2019.

Staff also served on numerous workgroups, committees and meetings to help address issues including, but not limited to, wetlands, forest management, lake monitoring, soil health and cover crops, urban and stormwater runoff, TMDLs, mercury contamination, pesticide and nutrient planning, general agriculture, watershed planning, source water protection, wellhead protection, State Revolving Fund (SRF) NPS on-site systems, Missouri Stream Teams, nutrient trading, and nutrient loss reduction strategy.

GOAL V. Implement and maintain streamlined NPS Program and fiscal processes that focus on timely award and expenditure of Section 319 grant funds according to EPA Grants Policy 12-06 "Timely Obligation, Award and Expenditure of EPA Grant Funds."

Objectives:

1. **Follow the Department's E3 (Enhancing Efficiency and Effectiveness) approach, which uses lean six sigma principles and methods that focus on the identification and elimination of non-value added activities to improve the delivery and operation of the NPS Program.**

   The Department is continually improving processes within the agency and in the products and services provided to our customers. The Department continues to implement the E3 (Enhancing Efficiency and Effectiveness) to reduce or eliminate non-value-added activities (waste) in our processes to improve customer service and the Department's ability to deliver our mission.

2. **Solicitation for Request for Project Proposals Under Section 319(h) Nonpoint Source Management Grants.**
   EPA provides nonpoint source grant funds to the Department through Section 319(h) of the Clean Water Act. These funds address nonpoint sources of pollution and administered from EPA through the Department to eligible pass-through recipients and for NPS program administration. Funds address NPS pollution through information/education, water quality monitoring, demonstrations, and implementation of practices that preserve, conserve, restore, or improve water quality. Since 2009, portions of the Section 319 funds are in the Department's PPG.

   Funds provide support to eligible public institutions of higher education, units or sub-units of government such as state, county, municipal and township governments, park systems and other local land managing agencies, conservation organizations, land conservancies or trusts and non-profit organizations for implementing conservation practices and other implementation activities as detailed in accepted WBPs. Programs, practices or activities designed and intended for addressing water body impairments caused by NPS pollution on Missouri's current 303(d) list or identified as the Department's priorities are considered for funding with priority for watersheds in eligible high-quality waters. Currently, the focus for watershed planning and implementation is: Lower Grand River, Big River, Spring River, Missouri River Corridor Watersheds (Sugar-Independence, Cooked-Lower Missouri, Moreau-Lower Missouri), Salt River Basin (North Fork Salt, South Fork Salt, and Salt), Meramec Basin (Meramec River), Sac, Niangua and the Upper Mississippi – Cape Girardeau (expanded watersheds).

   Entities that develop an acceptable 9-element WBP have priority consideration for submitting an implementation proposal for award through a formal RFP process. The RFP allows watershed groups and other eligible entities with EPA approved 9-element WBPs to submit projects for funding and also provide funding for the development of new plans or to update outdated plans within priority areas.

Proposed implementation projects within these watersheds must show how the project objectives meet the implementation goals of an accepted EPA 9-element WBP. The implementation goals must further eliminate NPS impairments and/or restore NPS impaired waters as identified in the current state 303(d) list or TMDL.

Summarized below in Table 12 is the status of the Department-accepted WBPs.

Table 12. Status of 9-Element WBPs

Priority Watershed	Watershed Based Plan	HUC 8	Year Accepted	Status of Watershed Based Plan	Water Body ID	Impaired Waterbodies (WBID/Pollutant)*	
						Category 4a TMDL	Category 5 303(d)
Y	Belews Creek	07140104	2008	Currently not eligible	2179	N/A	N/A
Y	Black Creek	07110005	2018	EPA accepted with conditions	111	Draft	E. coli
Y	Bonne Femme Creek	10300102	2007	Update in progress. Completion date: 2020	750, 753	N/A	E. coli
N	Brush Creek Mid-Shed	10240011	2006	Update needed	276	N/A	E.coli, PAHs
Y	Deer Creek	07140101	2011	Update scheduled: 2019	3826	N/A	Chloride, E. coli
Y	Dry Branch Wentzville	07110008	2013	Currently not eligible	161 ,182	N/A	N/A (delisted)
N	Table Rock Lake (Eastern)	11010001	2012	Update needed	7313	N/A	Nutrients
N	Table Rock Lake (Western)	11010001	2012	Update needed	7313	N/A	Nutrients
N	Elk River	11070208	2012	Update needed	3246	Nutrients 2004	N/A
Y	Fellow-McDaniels Lake / Fulbright Springs	10290106	2010	Update in progress. Completion Date 2019	7237 Covered under the Upper Little Sac Watershed Plan	N/A	Mercury in Fish Tissue
N	Finley Creek	11010002	2010	Update in progress. Completion Date 2019	2352 Covered under the James River Watershed Plan	N/A	N/A
N	Higginsville City Lake	10300104	2009	Currently not eligible	7190, 7191	N/A	N/A Delisted
Y	Hinkson Creek	10300102	2011	Update needed	1007, 1008, 1012	Aquatic Life Use 2011	E. coli

Priority Watershed	Watershed Based Plan	HUC 8	Year Accepted	Status of Watershed Based Plan	Water Body ID	Impaired Waterbodies (WBID/Pollutant)*	
						Category 4a TMDL	Category 5 303(d)
N	Jacks Fork River	11010008	2007	Update needed	2681	Fecal Coliform 2004	N/A
N	Lake of the Ozarks (Buck Hollow & Lick Branch)	10290109	2010	Update needed	7205 Lake Area: High priority recreational water	N/A	N/A
N	Lake of the Ozarks – Niangua Arm	10290109	2013	update needed	7205 Lake Area: High priority recreational water	N/A	N/A

Pass-through NPS Projects in FFY 2019

Missouri's NPS program staff managed 13 Section 319 grant funded projects during FFY 2019. As acknowledged by EPA Headquarters and Region 7, some project successes are not easily captured using the Grant Reporting and Tracking System (GRTS), EPA strategic plan measures, and WQ10 Success Stories. To better demonstrate successful efforts, water quality improvements and appropriate use of grant funds, this report includes in Appendix D, brief summaries of all active NPS projects and grant annual performance report (GAPR) for FFY 2019. The executive summaries provide an overview of the grant recipients, their intent, scope of work, and achievements that are not readily captured using traditional progress reporting methods. A new NPSMP helps Missouri explore and enact additional innovative and cost effective measures of water quality improvement and success with the support of EPA Region 7.

Summary of FFY 2019 - 319 Grant Program Dollars Spent

Table 13 below provides an overview of the grant funds received for FFY 2014 through FFY 2018, the amount expended in FFY 2019 and the amounts expended to date.

Table 13. 319 Grant Dollars Expended for Projects

Federal Aid No	Grant Federal Year	Expiration Date	Program Allocation	Amount Expended in FFY 2019	Amount Expended to Date	% Expended to Date
C9007407-20	2014	9/30/2019	$1,756,000	$369,158.30	$1,699,423.98	97%
C9007407-21	2015	8/31/2020	$1,738,050	$195,364.28	$861,946.71	50%
C9007407-22	2016	9/30/2021	$1,796,500	$552,426.25	$1,010,955.02	56%
C9007407-23	2017	9/30/2022	$1,858,500	$0.00	$0.00	0%
C9007407-24	2018	9/30/2023	$1,788,690	$0.00	$0.00	0%
C9007407-25	2019	9/30/2024	$1,818,000	$0.00	$0.00	0%
		Total	**$10,755,740**	**$1,116,948.83**	**$3,572,325.71**	**33%**

Missouri has multiple 319 NPS grants open concurrently that provide funding for projects and various other activities related to Missouri's Nonpoint Source Program. The Department typically expends older grant funds first, however spending from deobligated funds for other eligible projects is not uncommon due to variables such as fluctuating costs and revised work plans.

Table 14 below lists the sponsor name, subaward project name, project begin and end dates, and project award amounts for FFY 2019. Of the 13 subawards, the funding supported water quality education, demonstration projects, implementation of land management practices, watershed modeling, water quality monitoring and the implementing WBPs. Federal funding awarded to active subrecipients to date in FFY 2019 amounted to $4,656,540 with the nonfederal match commitment totaling $2,405,132. The total federal and nonfederal dollars used to support locally led NPS activities equaled $7,061,672.

Table 13. NPS Subawards Managed During FFY 2019

Count	Vendor Name	Project Name	Project Begin Date	Project End Date	Award Types and Amount		Required Match
					Project	Program	
1	Boone County Commission	Greater Bonne Femme WBP Development & Demonstration	8/1/2018	7/31/2020		$75,786.00	$50,524.00
2	James River Basin Partnership	Wilsons Creek Implementation Project	4/1/2017	3/31/2022	$410,715.00		$273,810.00
3	Lake of the Ozarks Watershed Alliance	LOWA LILs and Clean Marina	8/1/2016	7/31/2022	$542,000.00		$361,333.00
4	Missouri Botanical Gardens	Deer Creek Watershed Initiative - Project Phase III	1/1/2015	12/31/2019	$500,665.00	$213,654.00	$444,185.00
5	Missouri Corn Merchandising Council	Agricultural Edge-of-Field Watershed Monitoring	4/1/2016	3/31/2023		$1,000,000.00	$266,667.00
6	Missouri State University	James River Planning & Demo Project	5/1/2018	12/31/2020		$168,111.11	$112,074.07
7	SWCD Schuyler County	North and Middle Fabius WQ Improvement Project - Phase II	3/1/2014	10/31/2020	$328,952.56		$219,301.71
8	University of Missouri-Columbia	Statewide Lakes Assessment Project	4/1/2019	3/31/2020		$193,204.00	$128,802.67
9	University of Missouri-Columbia	Lakes of Missouri Volunteer Program	4/1/2019	3/31/2020		$330,552.00	$220,368.00
10	US Geological Survey	Wilsons Creek Data Collection	10/1/2019	9/30/2021		$87,800.00	$0.00
11	US Geological Survey	Ambient Water Quality Monitoring Network Analysis – Phase II	1/1/2018	6/30/2020		$313,000.00	$0.00
12	Watershed Committee of the Ozarks	Little Sac Restoration and Improvement Project	4/1/2014	11/30/2019		$284,705.85	$189,804.00
13	The Nature Conservancy	Shoal Creek Riparian Restoration and Enhancement Project	7/1/2019	6/30/2022		$207,395.00	$138,263.33
					$1,782,332.56	**$2,874,207.96**	**2,405,132.78**

GOAL VI. Build Partnerships to Enhance a Collaborative Watershed Approach to NPS Pollution.

Objectives:

1. **Strengthen and expand agency collaboration.**

Strategy a) Provide a link to the Department's website of the most recent EPA accepted NPSMP. Set an initial meeting with appropriate state, federal and local agencies, watershed organizations and citizens to review the NPSMP objectives and identify potential areas of collaboration.

STATUS:
Two partner meetings held in FFY 2019 revised the goals and objectives for the 2020-2025 NPSMP update.

Link to the EPA-approved Missouri Nonpoint Source Management Plan is on the Department's website (http://dnr.mo.gov/env/wpp/nps/index.html).

Strategy b) Develop and document the number of formal Memorandum of Agreements (MOAs) and other written agreements among watershed partners to ensure more formal stakeholder commitments and participation in the development and implementation of WBPs.

STATUS:
Following is a list of written agreements developed or continued in FFY 2019 (See Goal III, 2.b)

1. See Table 13 above for all written agreements.

Strategy c) Request that appropriate state and federal agencies involve the Department in reviews of NPS-related activities, including grant and funding opportunities.

STATUS:
NPS and/or SWCP staff are members of the Natural Resources Conservation Service's State Technical Committee, Environmental Quality Incentives Program (EQIP) subcommittee, National Water Quality Initiative (NWQI) review team, and Source Water Protection Plan review team.

Strategy d) Cooperatively develop and implement necessary action plans with appropriate federal agencies to address any federal activities that are inconsistent with NPSMP objectives.

STATUS:
No known inconsistencies with federal agencies to report for FFY 2019.

Strategy e) Attend watershed stakeholder meetings that include watershed project activity briefings or contributions by watershed representatives through the Missouri Watershed Planning process.

STATUS:
NPS staff and/or SWCP staff attended the following meetings: Nutrient Trading, Hypoxia Task Force, and Nutrient Loss Reduction Strategy. NPS staff also participated in meetings or discussions with partners regarding watershed planning for the Sac, Little Sac, Lower and entire Meramec, Niangua, Spring, Lower Grand, East Fork Locus Creek, Big Oak Tree State Park, Lamar Lake, Perry County Karst, Greater Bonne Femme, Deer Creek (City of Frontenac, City of Brentwood), Cuivre, Wilsons Creek, and the James River.

Strategy f) Report on the resource commitments (i.e., staffing and/or funding) and stakeholder support provided in developing and implementing WBPs through the required annual NPS Program Progress report to EPA Region 7.

STATUS:
This information is routinely provided by the Department through the EPA Grants Reporting and Tracking System (GRTS) for projects funded with Section 319 Grant funds. Subgrantees provide project progress reports to the Department typically on a quarterly basis, and NPS staff enter them into GRTS.

Strategy g) Encourage federal consistency with state NPSMP objectives.

STATUS:
Ongoing effort and communication.

Strategy h) Notify EPA of any unresolved issues with federal agencies.

STATUS:
As needed. No known issues to report for FFY 2019.

PARTNERSHIP COLLABORATIONS:
Partner agency impacts on NPS pollution are critical to nonpoint source programs. Both technical and financial assistance is available from various state agencies to address nonpoint source pollution.

Missouri Department of Health and Senior Services
http://health.mo.gov/

The mission of the Department of Health and Senior Services (DHSS), Bureau of Environmental Health Services, and Bureau of Environmental Epidemiology is to protect and promote quality of life and health for all Missouri citizens by developing and implementing programs and systems that provide:

- Assessment services for environmental health conditions,
- Public assurance through education, effective regulation and oversight, and surveillance of environmental health conditions, and
- Public health policies that effectively achieve the DHSS mission.

There is cooperation and partnership between DHSS and the Department on a variety of issues. Regarding nonpoint source issues, this cooperation and partnership often relates to private drinking water, individual on-site wastewater, and other wastewater treatment systems. The DHSS Health Laboratory provides limited private well testing services for public assurance of environment health. Local county public health agencies and DHSS provide technical advice to private well owners related to drinking water quality.

The DHSS Bureau of Environmental Health Services works to educate and register or license soil evaluators, installation contractors and private inspectors of on-site wastewater treatment systems. DHSS also assists local county public health agencies on the issuance of on-site wastewater treatment system permits and variances associated with the installation and/or permitting of those systems. Find a listing by county of On-Site Wastewater Treatment System installers at http://health.mo.gov//living/environment/onsite/counties/index.php.

To assure the public of fish consumption safety, the DHSS Bureau of Environmental Epidemiology also assesses fish tissue data obtained from MDC and the Department and completes an annual fish consumption advisory (http://health.mo.gov/living/environment/fishadvisory/index.php). In addition, DHSS also provides technical support for the Department's Section 303(d) Impaired Waters Listing and TMDL listings. As needed, DHSS also cooperates with MDC and the Department on fish kills and pollution investigations to protect public health from these events.

Missouri Department of Agriculture
http://mda.mo.gov

The Missouri Department of Agriculture (MDA) sets agriculture policy and assists farmers throughout the state. While the Department maintains its regulatory functions, its expanded duties include consumer protection; public health roles; environmental advocacy; agricultural marketing; public information and consumer outreach; and promoting new technology and new uses for Missouri's agricultural goods.

As its primary mission, the Department strives to serve, promote, and protect the agricultural producers, processors, and consumers of Missouri's food, fuel, and fiber products.

The Department's SWCP provided $123,092 and $41,090 in match funds in the form of financial and technical assistance for an RCPP project sponsored by Department of Agriculture for cover crops.

Pesticide Applicator Training
Section 281.100 and 2 CSR 70-25.050 of the Missouri Pesticide Use Act and Code of State Regulations authorizes the Missouri Department of Agriculture's Bureau of Pesticide Control to establish minimum criteria for recertifying Missouri's certified commercial and non-commercial pesticide applicators, public operators, and private applicators. Each recertification training course must be approved in advance by the Bureau of Pesticide Control (http://agriculture.mo.gov/plants/pesticides/).

Dead Animal Reporting
The Animal Health Division responds to reports of dead livestock that have not been properly disposed. Division staff does not dispose of the animals, but attempt to locate those responsible and see that they properly dispose of the carcasses in a timely manner as required by the Disposal of Dead Animal Law, Chapter 269, RSMo. https://agriculture.mo.gov/animals/health/

United States Geological Survey
http://mo.water.usgs.gov/district_info/index.htm (MO Water Science Center)

The United States Geological Survey (USGS) is the nation's largest earth-science agency and has the principal responsibility within the federal government for providing hydrologic information and for appraising the nation's water resources. The water resources of Missouri consist of numerous streams, springs, lakes, and aquifer systems, monitored by the USGS Missouri Water Science Center, and this hydrologic and other data used in research and hydrologic studies to describe the quantity, quality, and location of Missouri's water resources. The collection, analysis, and interpretation of these data are in cooperation with other Federal, State and local agencies, universities, and research centers. All data are available on the Internet at http://waterdata.usgs.gov/mo/nwis.

The Department also collaborates with the USGS to support the state's ambient water quality monitoring network. This network collects long-term, high-quality data that supports water quality decisions in the state. These data have several important applications including the development of water quality standards, water quality-based discharge permits and TMDL studies, assessment of long-term water quality trends and efficacy of the Department's water quality protection and monitoring activities. See specific FFY 2019 sites monitored in Goal I, Table 3.

Natural Resources Conservation Service (NRCS)
http://www.nrcs.usda.gov/

Federal Voluntary Approach to Sound Stewardship
For over 80 years, the NRCS has worked with landowners to maintain healthy and productive landscapes. NRCS delivers technical assistance based on science and is suited to a customer's specific needs. Through its national framework, the NRCS works extensively with private landowners, especially farmers and ranchers, to implement wise use of natural resources. To accomplish this goal, the agency encourages voluntary implementation of conservation practices that take a systems approach to address environmental issues. Research has shown that conservation practices, especially when installed as a system, make positive contributions to water quality through sediment, nutrient, and other input reductions in both runoff and drainage waters. The objective is to maintain a productive land that is environmentally sustainable.

Missouri NRCS cooperates with state and local entities to set priorities and allocate technical and financial assistance through federal conservation programs. NRCS offers voluntary programs to eligible participants to provide financial assistance to help manage natural resources in a sustainable manner. Contingent upon congressional funding levels, the agency approves contracts to help fund conservation practices for soil, water, air, plant and other resource concerns. Whenever possible, the focus of conservation efforts is to improve impaired watersheds or to protect outstanding waters while improving local conditions for landowners and producers.

Conservation Implementation for Better Landscapes
This fiscal year, the NRCS and the Missouri Department of Natural Resources continued a long-standing partnership to improve conservation for Missouri citizens. Activities like the State Technical Committee, Mississippi River Basin Initiative, National Water Quality Initiative, State Soil and Water Cost-Share, and the 319 program are examples of programs offered because of collaborative administrative efforts.

Working Lands and Easement Options Offered by NRCS
Perhaps the most essential program administered by NRCS is the **Conservation Technical Assistance Program** (CTA). This federal assistance allows the NRCS to extend technical advice to private landowners free of charge and without the obligation to participate in financial assistance programs. CTA also allows federal staff to assist soil and water conservation districts implement the state cost-share program. Providing technical advice to land managers places them in the best position to make well-informed decisions regarding conservation. This assistance takes place on actively farmed working lands and on land considered for conservation easements. Summarized in tables 14 and 15 below are USDA, NRCS investments for the Working Lands and Conservation Easement Programs for FFY 2019.

NRCS programs that are especially pertinent to NPS pollution efforts include:

- The **Regional Conservation Partnership Program** (RCPP) promotes coordination between NRCS and its partners to deliver conservation assistance to producers and landowners. NRCS assists producers through partnership efforts in and through program contracts or easement agreements. Assistance is in accordance with the rules of the Farm Bill Program and in certain areas, the Watershed Operations and Flood Prevention Program.
- The **Environmental Quality Incentives Program (EQIP)** is a working land program that provides financial and technical assistance to agricultural producers to address natural resource concerns and improve water and air quality, conserve ground and surface water, reduce soil erosion and sedimentation or improve or create wildlife habitat. In addition to general EQIP, landscape initiatives like the Mississippi River Basin Healthy Watersheds Initiative and the National Water Quality Initiative are examples of targeted EQIP efforts in critical watersheds.
- The **Conservation Stewardship Program (CSP)** is a working land program that provides financial and technical assistance to agricultural producers that advance conservation improvement of soil, water, air, energy, plant and animals.
- The **Agricultural Conservation Easement Program** (ACEP) is an easement program that provides financial and technical assistance to help conserve agricultural lands and wetlands and their related benefits. This program consolidates three former programs – Wetlands Reserve Program, Grassland Reserve Program, and the Farm and Ranch Land Protection Program.
- The **Conservation Reserve Program (CRP)** is a cost-share and rental payment program administered by the USDA Farm Service Agency (FSA). NRCS provides technical conservation assistance to help implement the program.

Table 14. Federal Progress for Fiscal Year 2019 Through Working Lands Programs.

NRCS Investments Made to Combat NPS Issues in Missouri Through Working Lands Programs Source ProTracts, USDA – REAP Division Certified October 1, 2018 – September 30, 2019			
Watershed	**EQIP, RCPP and CSP Contracting Activity**		
	No. of Contracts Initiated	**Acres**	**Payments (Current and Previous Contracts)**
07100009 Lower Des Moines	< 5	197	16,503
07110001 Bear-Wyaconda	43	2879	496,222
07110002 North Fabius	25	1939	487,813
07110003 South Fabius	8	397	429,652
07110004 The Sny	38	4089	464,826
07110005 North Fork Salt	**26**	**3463**	**669,245**
07110006 South Fork Salt	**41**	**3407**	**822,740**
07110007 Salt	**46**	**5332**	**603,860**
07110008 Cuivre	41	8366	2,733,172
07110009 Peruque-Piasa	6	216	82,137
07140101 Cahokia-Joachim	12	435	185,815
07140102 Meramec	**26**	**2963**	**823,106**
07140103 Bourbeuse	23	2664	429,370
07140104 Big	**8**	**477**	**31,182**
07140105 Upper Mississippi – Cape Girardeau	**59**	**7066**	**799,341**

NRCS Investments Made to Combat NPS Issues in Missouri Through Working Lands Programs Source ProTracts, USDA – REAP Division Certified October 1, 2018 – September 30, 2019			
Watershed	**EQIP, RCPP and CSP Contracting Activity**		
	No. of Contracts Initiated	**Acres**	**Payments (Current and Previous Contracts)**
07140107 Whitewater	74	9483	991,718
08010100 Lower Mississippi - Memphis	10	1953	1,392,068
08020201 New Madrid – St. Johns	29	6007	2,070,096
08020202 Upper St. Francis	35	4153	10,195,032
08020203 Lower St. Francis	14	7491	79,200
08020204 Little River Ditches	67	44080	73,846
10240004 Nishnabotna	< 5	203	1,256,194
10240005 Tarkio-Wolf	37	9043	430,068
10240010 Nodaway	8	1745	1,120,590
10240011 Independence – Sugar	**30**	**9613**	**839,694**
10240012 Platte	41	10219	307,196
10240013 One Hundred and Two	9	651	9,000
10280101 Upper Grand	109	9246	2,312,205
10280102 Thompson	28	3870	461,555
10280103 Lower Grand	**91**	**12028**	**2,653,140**
10280201 Upper Chariton	14	5108	175,102
10280202 Lower Chariton	27	2628	380,391
10280203 Little Chariton	26	1702	246,760
10290102 Lower Marais Des Cygnes	7	2059	168,135
10290103 Little Osage	< 5	< 100	122,597
10290104 Marmaton	12	926	281,941
10290105 Harry S. Truman Reservoir	27	2991	435,836
10290106 Sac	**97**	**8799**	**1,748,247**
10290107 Pomme De Terre	14	1491	332,407
10290108 South Grand	105	11558	1,354,946
10290109 Lake of the Ozarks	21	1407	280,276
10290110 Niangua	**11**	**1056**	**291,022**
10290111 Lower Osage	40	3512	1,042,139
10290201 Upper Gasconade	74	13,317	1,262,700
10290202 Big Piney	30	3381	830,840
10290203 Lower Gasconade	22	4342	398,570
10300101 Lower Missouri -Crooked	**85**	**7172**	**1,328,733**
10300102 Lower Missouri-Moreau	**174**	**11,086**	**1,756,002**
10300103 Lamine	43	3531	545,726
10300104 Blackwater	33	4136	646,844
10300200 Lower Missouri	**47**	**8656**	**924,305**
11010001 Beaver Reservoir	< 5	< 100	32,852
11010002 James	45	1526	1,010,632
11010003 Bull Shoals Lake	28	7385	549,162
11010006 North Fork White	36	7219	907,573
11010007 Upper Black	20	4683	741,677
11010008 Current	52	7158	1,092,250
11010009 Lower Black	< 5	839	39,924
11010010 Spring	**16**	**1842**	**517,409**
11010011 Eleven Point	36	3925	815,369

NRCS Investments Made to Combat NPS Issues in Missouri Through Working Lands Programs Source ProTracts, USDA – REAP Division Certified October 1, 2018 – September 30, 2019			
Watershed	**EQIP, RCPP and CSP Contracting Activity**		
	No. of Contracts Initiated	**Acres**	**Payments (Current and Previous Contracts)**
11070206 Lake O' The Cherokees	< 5	< 100	2,787
11070207 Spring	89	10655	2,470,397
11070208 Elk	6	< 100	627,975
Totals	**2221+**	**317,765 +**	**$56,628,113**

Note: Priority watersheds are in bold.

Table 15. Federal Progress for Fiscal Year 2019 Through Conservation Easements

Federal Investments Made Toward Nonpoint Issues in Missouri Through Conservation Easements Source: NEST October 1, 2018 – September 30, 2019						
Watershed Basis	ACEP-WRE and WRP					
	Enrolled		**Closed**		**Restored**	
	Easements	**Acres**	**Easements**	**Acres**	**Easements**	**Acres**
07110004 The Sny	1	211.5				
07110005 North Fork Salt					**1**	**44.1**
08010100 Lower Mississippi-Memphis	2	456.5	2	50.83		
08020201 New Madrid-St. Johns	2	842.5	5	2547.92	3	262.78
08020204 Little River Ditches	2	657.2	1	262.94		
10280103 Lower Grand	**2**	**196.4**			**1**	**41.34**
10280203 Little Chariton					1	44.2
10290102 Lower Marais Des Cygnes					1	433.8
10300103 Lamine			1	271.99		
11070207 Spring					**1**	**128.46**
Totals	**9**	**2364.1**	**9**	**3133.68**	**8**	**954.68**

Note: Priority watersheds are in bold.

Targeting Conservation for Better Efficiency

As advancements in science are available, conservation professionals are gaining a better understanding of the importance of targeting efforts. Not all lands contribute equally to sediment and nutrient loading of streams and lakes. Identifying vulnerable areas on the land provides the greatest opportunity to reduce pollution effects. Each year, requests for federal funds exceed allocations made by the Secretary of Agriculture. Historically, NRCS ranking and screening protocols strive to select applications to make significant environmental enhancements to land in the fairest possible manner.

In addition to statewide operating procedures, the Missouri NRCS participates in two national landscape initiatives that further target conservation activities in priority watersheds. In Missouri, the NRCS State Conservationist declared certain 8-digit watersheds eligible to participate in national landscape initiative conservation programs. The Mississippi River Basin Healthy Watershed Initiative (MRBI) and the National Water Quality Initiative (NWQI) provide additional technical and financial assistance available to solve watershed concerns. Together, MRBI and NWQI accelerate funding for land treatment over and above existing NRCS efforts.

The Department augments NRCS programs by providing program input, assisting sponsors with technical assistance, and funding water quality monitoring. Although no matching funds are required for the MRBI and NWQI programs, MDNR leveraged state Parks, Soils, and Water sales tax funds to enhance the success of these programs. Similarly, the additional water quality monitoring makes evaluation of the conservation benefits of these landscape initiatives more thorough.

Future Efforts by the NRCS

The Secretary of Agriculture sets national priorities that may vary according to the administrative governance in place, but the protection of soil and water are paramount for the agency. All NRCS programs and operations are subject to congressional authorization through the federal budgeting process, primarily through the "Farm Bill". These activities undergo periodic revisions and are subject to the prevailing political climate. Even so, most elected officials recognize how important conservation investments are to benefit the nation's resources and productivity. Although the administration and funding levels may fluctuate from year to year, future conservation programs should remain available to the public in some form**.**

Missouri Department of Conservation (MDC)

http://mdc.mo.gov/

The Missouri Department of Conservation's mission is to protect and manage the fish, and wildlife resources of the state; to facilitate and provide opportunity for all citizens to use, enjoy, and learn about these resources. MDC's vision is a future with healthy fish, forests, and wildlife where all people appreciate nature. MDC's goals are to:

- Take Care of Nature;
- Connect People with Nature;
- Maintain Public Trust.

During FFY 2019, MDC provided forest management on-site technical assistance to 554 landowners throughout the state, impacting 52,520 acres, and staff wrote 92 forest management plans covering 14,563 acres. Fisheries Division staff responded to 5,398 requests for watershed, floodplain, riparian corridor, stream or lake management information and/or technical assistance. Staff made 463 on-site visits and wrote 114 recommendations or management plans. On-site work included 64 fish-population surveys and 26 fish-kill investigations. Staff conducted 19 stream or lake management workshops for 515 people. Staff also coordinated or participated in 19 active watershed-management projects. The Outreach and Education Division provided $503,317 in grant funding to Missouri schools through the Discover Nature Schools curriculum program. Currently, 1,450 schools are actively participating in the Discover Nature Schools program.

The Department's Soil and Water Conservation Program provided $486,694 and $20,000 in match funds in the form of financial and technical assistance for three RCPP projects sponsored by MDC. These programs are more competitive and help more farmers and ranchers reach their land management goals with SWCP partnership and contributions.

A summary of the annual accomplishments of MDC is in the January issue of the Missouri Conservationist magazine, at: www.mdc.mo.gov/conmag.

2. Soil and Water Conservation District collaboration within watershed boundaries.

Strategy a) Conduct joint meetings of SWCDs within a watershed to determine common goals, needs and solutions.
Strategy b) Provide updates to the Soil and Water Districts Commission regarding the Missouri planning framework and efforts in each watershed.

The Department's programs listed below work collaboratively with the Nonpoint Source Program to reduce NPS pollutant loads and benefit 319 projects through shared funding in implementing conservation practices, evaluating project outcomes or by providing information for WBPs.

Soil and Water Conservation Cost-Share Program - The Missouri Soil and Water Conservation Cost-Share Program assists farmers and landowners with soil and water conservation by providing partial reimbursement up to 75% of the estimated cost for conservation practices. Landowners complete the practices based on SWCP guidelines and fund the remaining 25% or more of the practice costs. The SWCP works with 114 soil and water conservation districts (SWCDs) to address goals targeting agricultural NPS pollution through implementation of these practices. Each district provides technical and financial assistance, education, and administration for conservation practices to local farmers and landowners. The cost-share practices, categorized within seven resource concerns that landowners implement with approval of the local SWCD board of supervisors that address soil erosion, and surface water and groundwater quality.

The seven resource concern areas are: Animal Waste Management, Grazing Management, Irrigation Management, Nutrient and Pest Management, Sensitive Areas, Sheet & Rill and Gully Erosion, and Woodland Erosion. There are over 50 conservation practices within these resource concern areas. SWCDs set goals for each resource concern based on their annual Needs Assessment developed from cost-share funding requests for conservation practices. Most practices address soil erosion and reduce sedimentation in our rivers and streams, but many are also effective in reducing runoff of nitrogen, phosphorus, pesticides and bacteria. These practices reduce pollutant runoff by a variety of methods (e.g., increasing crop residue and soil organic matter, improving vegetation, diverting or containing runoff water, protecting waterways and forested areas from livestock, reducing rain and wind erosion).

The estimated soil saved over the lifespan of the 8,734 practices implemented during the FFY 2019 reporting period (October 1, 2018 to September 30, 2019) was 1.1 million tons. The lifespan of the practice is a length of maintenance for which the practice must meet NRCS or other approved standards and specifications, and Soil and Water Districts Commission policies. Most conservation practices have a lifespan of ten years except for vegetative establishment and improvement (seedings) which have a five-year lifespan, and nutrient management, pest management and cover crops have a one-year lifespan. A

total of 493,327 acres were treated. Table 16 below is a summary of the FFY 2019 cost-share payments, estimated soil saved, and conservation practices implemented by state cost-share programs in Missouri's HUC-8 watersheds.

Table 16. FFY 2019 State Cost Share, Tons of Soil Saved, Practices Implemented and Acres Treated by HUC-8 Watershed (cumulative for life of project)

HUC_8	COST SHARE	TONS OF SOIL SAVED	NO OF PRACTICES	ACRES	HUC_8	COST SHARE	TONS OF SOIL SAVED	NO OF PRACTICES	ACRES
07100009	$ 15,151.93	260.00	8	179.67	**10280203**	**$ 320,976.37**	**11,585.50**	**46**	**2,495.50**
07110001	$ 542,915.49	22,856.00	87	3,969.15	10290102	$ 90,161.34	6,935.00	23	1,014.08
07110002	$ 808,416.31	46,508.00	127	6,667.17	10290103	$ 139,187.00	290.00	37	3,869.50
07110003	$ 588,028.66	9,161.50	87	6,622.03	10290104	$ 229,313.89	1,997.50	72	5,683.10
07110004	$ 503,911.15	14,462.00	91	5,012.40	10290105	$ 418,646.35	7,091.00	125	9,298.80
07110005	**$ 639,335.77**	**25,505.50**	**102**	**5,406.11**	**10290106**	**$ 530,119.00**	**4,147.00**	**129**	**8,186.80**
07110006	**$1,071,928.54**	**45,800.50**	**223**	**12,264.50**	10290107	$ 135,582.50	570.00	51	2,158.00
07110007	**$ 260,182.62**	**47,120.00**	**47**	**2,048.40**	10290108	$ 543,546.29	19,388.00	137	7,692.20
07110008	$ 692,418.42	7,674.00	249	15,829.47	10290109	$ 249,022.63	10,234.60	78	3,141.40
07110009	$ 13,080.50	0.00	9	337.00	**10290110**	**$ 322,907.15**	**8,622.00**	**89**	**3,817.20**
07140101	$ 77,090.88	410.00	46	1,332.40	10290111	$ 656,101.43	18,576.20	247	12,626.50
07140102	**$ 708,743.77**	**9,831.50**	**156**	**10,909.44**	10290201	$ 642,916.27	30,654.50	221	11,960.40
07140103	$ 210,960.51	6,590.00	87	4,351.90	10290202	$ 506,694.29	3,767.50	151	10,914.30
07140104	**$ 74,018.19**	**2,244.70**	**20**	**952.20**	10290203	$ 405,285.39	17,627.20	182	8,087.14
07140105	**$ 577,283.98**	**9,692.40**	**208**	**6,557.40**	**10300101**	**$ 1,353,052.61**	**29,410.20**	**340**	**16,689.33**
07140107	$ 687,461.63	43,787.20	208	6,607.46	**10300102**	**$ 1,786,054.39**	**13,939.50**	**635**	**38,955.25**
08020201	$ 65,275.27	5,710.00	31	1,444.50	10300103	$ 751,473.99	6,004.50	212	11,303.94
08020202	$ 304,544.32	33,724.00	86	2,781.30	10300104	$ 1,349,841.61	23,726.00	252	13,511.82
08020203	$ 330,012.30	10,865.00	86	4,678.40	**10300200**	**$ 389,865.08**	**9,017.00**	**217**	**8,730.40**
08020204	$1,320,718.78	146,911.80	365	24,794.54	11010001	$ 34,185.72	0.00	5	278.20
08020302	$ 61,436.46	1,700.00	23	821.40	11010002	$ 397,213.99	6,930.00	131	6,173.22
10240004	$ 38,849.21	3,730.00	3	158.97	11010003	$ 327,856.67	1,301.80	105	7,333.80
10240005	$ 915,256.31	45,332.00	112	6,347.98	11010006	$ 986,568.45	38,145.00	194	18,628.10
10240010	$ 632,973.35	8,294.00	94	6,031.36	11010007	$ 533,233.92	24,704.00	131	6,773.70
10240011	**$ 225,686.02**	**42,712.00**	**75**	**5,022.41**	11010008	$ 672,763.28	17,264.50	170	11,200.12
10240012	$1,427,284.39	41,762.20	297	16,097.09	11010009	$ 29,861.98	2,620.00	10	348.80
10240013	$ 454,803.69	8,987.00	79	3,909.80	11010010	$ 229,630.66	1,071.00	74	4,746.60
10280101	$2,598,288.30	53,384.20	614	33,060.05	11010011	$ 250,007.83	6,932.50	59	4,258.65

HUC_8	COST SHARE	TONS OF SOIL SAVED	NO OF PRACTICES	ACRES	HUC_8	COST SHARE	TONS OF SOIL SAVED	NO OF PRACTICES	ACRES
10280102	$1,301,935.03	12,165.50	240	12,974.47	11070206	$ 15,813.32	2,687.00	9	726.30
10280103	$1,704,939.79	27,526.50	376	25,805.10	**11070207**	**$ 795,679.23**	**27,971.30**	**266**	**13,980.83**
10280201	$ 133,609.62	5,246.40	33	1,175.24	11070208	$ 205,762.09	0.00	28	2,400.22
10280202	$ 272,174.75	10,026.00	39	2,193.43	**Total**	**$ 34,558,040.66**	**1,103,190.20**	**8,734.00**	**493,326.94**

Note: Priority watersheds bolded.

Missouri Nutrient Loss Reduction Strategy

Development of the Nutrient Loss Reduction Strategy (NLRS) (https://dnr.mo.gov/env/wpp/mnrsc/docs/nlrs-strategy-2014.pdf) over a three-year period from 2011 through 2014 used a Clean Water Act Section 104(b)(3) grant and funding from existing state, federal, local, and private resources. A committee composed of representatives from state agricultural, environmental, and natural resource organizations formed to develop recommendations for reducing nutrient loads to surface water and groundwater in Missouri through an open, consensus-building process.

The 2008 Gulf Hypoxia Action Plan that established a goal for reducing the loss of nitrogen and phosphorus to the Gulf of Mexico through a collaborative effort between 12 states located within the Mississippi River/Atchafalaya Basin and five federal agencies was the impetus for development of the NLRS. Staff from the Departments of Natural Resources and Agriculture represent Missouri on the Hypoxia Task Force and its coordinating committee. The role of this task force is to provide executive-level direction and support for coordinating the actions of participating states and organizations in reducing nutrient loads throughout the Mississippi River/Atchafalaya Basin. Although the focus of Missouri's strategy is on reducing nutrient loads to Missouri's waters, these efforts will also help reduce nutrient loads downstream in the Mississippi River/Atchafalaya Basin and the Gulf of Mexico.

An internal workgroup consisting of staff from the Water Protection and Soil and Water Conservation Programs meets quarterly to discuss the progress toward the goals of Missouri's strategy. There are many recommended actions listed in the strategy, making it difficult to prioritize and focus Department resources. Meetings held identify areas where coordination would be beneficial. The workgroup will produce biennial reports to communicate progress to the public. The Department published the first report in 2018 (https://dnr.mo.gov/env/wpp/mnrsc/docs/nlrs-2018-update.pdf).

The Status of Missouri's Water Quality Trading Framework

The Clean Water Commission approved the Missouri Water Quality Trading Framework (https://dnr.mo.gov/env/wpp/cwc/docs/tab-10-wqtrading-framework.pdf) on October 5, 2016. The framework is a guidance document for use by any entity wishing to develop a trading program. It is flexible, but also defines major elements the Department will require in a trading program proposal. In 2019, the Department began actively developing the statewide trading program; solely focused on nitrogen and phosphorus. However, as outlined in the framework, it will be possible to expand the structure of the trading program to incorporate other pollutants in the future. The Department will assess the nutrient loading reduction effectiveness of agricultural BMPs throughout a number of watersheds in Missouri in 2020 with the express purpose of formulating nutrient credit prices using the best available data. The Department continues to promote water quality trading as a market-based approach to addressing nutrient pollution and continues to offer its support to any entity wishing to pursue the development of a program.

3. Support and implement green infrastructure resources in rural and urban watersheds.

Strategy a) Work with rural and urban partners to understand the management of green infrastructure resources in Missouri, to enhance water quality protection and achieve other water quality benefits.

STATUS:
Many of the green infrastructure activities were accomplished with the assistance and coordination of the Missouri Association of Councils of Governments and Missouri's 19 regional planning organizations (RPO).

Strategy b) Collaborate with Missouri's 19 regional planning organizations and provide funding to develop and implement green infrastructure projects.

STATUS:
See Strategy c) below and also Goal III, Objective 1.

Strategy c) Prepare a strategy for promoting protection and management of green infrastructure resources at the state and community level or collaborate with the RPOs if regional strategies are already developed.

STATUS:
The Department relies on and supports RPO partners such as East-West Gateway, Mid-America Regional Council and others because they have strategic plans in place that address watershed management and green infrastructure.

East-West Gateway Council of Governments (EWG) – St. Louis, Mo
http://www.ewgateway.org/community-planning/environmental/water-resources/.
A visit to this site will show the many projects EWG is doing in regards to green infrastructure and development of a low impact development BMP toolbox as well as reference to many other web resources. EWG regularly partners with the Department on numerous water quality projects

Mid-America Regional Council (MARC) – Kansas City, Mo
http://www.marc.org/Environment/Plans-Studies
A visit to this site shows water quality plans and studies and their MetroGreen plan. In addition their Water Resources site provides great reference materials for improving water quality, landscaping and lawn care (i.e., rain gardens, rain barrels, native planting, earth-friendly lawn tips), stormwater best management practices, stream setback ordinances, and regional watershed management tools.

Strategy d) Promote and support stakeholders with Low Impact Development (LID) concepts or implemented LID projects with use of grant funds by providing tours of sites, inviting stakeholders to present their LID concepts at conferences, summits, and meetings.

STATUS:
The Department continues to promote the "*Missouri Guide to Green Infrastructure*" guide published in May 2013 (http://dnr.mo.gov/env/wpp/stormwater/mo-gi-guide.htm). A major focus of this guide is to define green infrastructure as a sustainable approach to stormwater management by employing strategies to maintain or restore natural hydrology. Such strategies include infiltration, evapotranspiration, capture and reuse of stormwater. This guide is not intended to be a design manual. The purpose of this guide is to present green infrastructure as a strategic approach to land development that addresses ecological, economic and social needs, also known as the triple bottom line. It is intended to aid municipalities and their development communities in a general understanding of how to incorporate green infrastructure into the community.

The Department funded projects with 319 NPS grant funding for green infrastructure efforts. A few examples are summarized below:

1. Missouri Botanical Garden – Deer Creek Watershed Initiative Project
2. Lake of the Ozark Watershed Alliance – LOWA LILS (low impact landscapes) and Clean Marinas Project
3. James River Partnership - Wilsons Creek Implementation Project

A summary on these projects can be found in Appendix D.

Strategy f) Continue support of green infrastructure with financial assistance through the Department's Clean Water State Revolving Fund (CWSRF) Green Project Reserve to encourage recipients to use green components, which help achieve environmentally sustainable solutions to infrastructure needs.

STATUS:
The Clean Water State Revolving Fund program reserves ten percent of its annual capitalization grant for projects that that address green infrastructure, water or energy efficiency improvements or other environmentally innovative activities through the Green Project Reserve. Department staff work directly with program applicants prior to funding to identify projects or components of projects that address green infrastructure, water or energy efficiency improvements or other environmentally innovative activities.

GOAL VII. Funding

Objectives:

1. **Look for new or existing resources to support state NPS efforts and to be more flexible in implementing the NPS Program.**

Strategy a) Beginning in FFY 2015, develop an eligible strategy using the Department's SWCP and other state NPS funding sources to meet requirements for EPA's "Exemption from the 50% Watershed Funding Requirement for Substantial State Fund Leveraging," to maximize flexibility for support of voluntary NPS outcomes.

Strategy b) Use state leverage funds in implementing WBPs and accepted alternative watershed plans for restoring NPS impaired waters.

Strategy c) Use state leverage funds to provide cost-share to landowners to voluntarily implement conservation practices that reduce NPS pollution in priority areas identified in the Missouri Watershed Planning cycle.

Strategy d) Use state leverage funds to assist with water quality monitoring, modeling and assessments, including estimates of NPS load reductions where needed, especially where SWCD offices are implementing BMPs or conservation practices as part of a WBP. The Revised Universal Soil Loss Equation (RUSLE) http://www.ars.usda.gov/Research/docs.htm?docid=5971 is used to determine sediment runoff reductions.

Strategy e) Track state leverage funds by project.

Strategy f) Develop new or utilize existing brochures, websites and other outreach materials about funding programs and distribute to targeted audiences.

Strategy g) Include or invite other agencies to conferences, summits, etc. to explain their funding programs to targeted audiences and how the funding can leverage NPS efforts.

STATUS:

Regarding all of the above listed strategies for Objective #1, annually EPA Region 7 works with the Department to meet eligibility for the "Exemption from the 50% Watershed Funding Requirement for Substantial State Fund Leveraging," which was a new provision in the FY 2014 319 Nonpoint Source Guidance. EPA Region 7 first approved Missouri's exemption on August 31, 2017, which covered the FFY 2016 through 2018. The exemption provides the NPS program with much needed flexibility for projects. The Department leverages funds and partnerships to support more comprehensive projects. The Department continues to use state funds (such as Soil and Water Conservation Program cost-share and other state partners) as leverage where there are EPA accepted 9-element WBPs. The Department requested a waiver for FFY 2019 grant year.

2. **Leverage NPS efforts utilizing Farm Bill programs.**
(NRCS's most recent reporting period FFY 2019)

Strategy a) Funding to assist with edge-of-field and in-stream monitoring to measure effectiveness of each project to reduce nutrient and sediment runoff through the MRBI.

STATUS:
Missouri offered a sign up for FFY 2019 Edge of Field Monitoring, but there were no applicants and thus no obligations for edge of field monitoring activities.

In fiscal year 2019, five Mississippi River Healthy Watersheds Initiative (MRBI) projects obligated a total of $2,173,372 through 59 contracts for voluntary conservation practices.

Strategy b) RCPP funds are available through a partnership with the USDA's Natural Resources Conservation Service for conservation efforts designed to improve water quality. Funds from NPS 319 grants will be leveraging monitoring efforts with this program.

STATUS:
Regional Conservation Partnership Program (RCPP) – In FFY 2016, the Department signed an agreement for the Regional Conservation Partnership Program from NRCS entitled, "Missouri Targeted Conservation." This project is a collaborative statewide partnership approach to implement geographic targeting of cost-effective farm conservation practices in high priority watersheds and catchment basins in Missouri. In the five-year project, the contribution from NRCS is $6 million to this project through RCPP, with partners contributing $15.6 million. Success measured during the five-year project used farm-scale edge-of-field agricultural runoff monitoring of nutrients and sediment to study the effectiveness and demonstrate the benefits of agricultural conservation practices. A partnership with the Missouri Corn Merchandising Council (MCMC) and the Missouri Soybean Merchandising Council (MSMC) conducts the edge-of-field monitoring. In FFY 2019, the Soil and Water Conservation Program provided match to the Missouri Targeted Conservation project of $1,784,986 Financial Assistance (FA) and $1,309,565 in Technical Assistance (TA). See summarized information regarding the Targeted Watershed Conservation – Regional Conservation Partnership Program FFY 2018 at: https://mosoilandwater.land/internal/regional-conservation-partnership-program.

In FFY 2019, the Soil and Water Conservation Program contributed match to the Missouri Department of Conservation RCPP projects with $486,694 FA and $20,000 TA. In addition, the Missouri Department of Agriculture received funding from the Soil and Water Conservation Program for their RCPP project entitled, Cover Crops for Soil Health and Water that began in FFY 2017. In FFY 2019, the program provided $123,092 FA and $41,090 TA.

Strategy c) Continue to encourage SWCDs to consider leveraging Environmental Quality Incentives Program (EQIP) funds with NPS 319 grant funds and other state funding where funds can support activities that may not be eligible within a particular program.

STATUS:

From April 2017 through March 2023, the Department will provide $1,000,000 in Section 319 Project funds through an agreement with the Department's and the Soil and Water Conservation Program to support water quality monitoring for the USDA RCPP project titled "Agricultural Edge of Field Monitoring". The Soil and Water Conservation Program entered into a sub agreement with the Missouri Corn Merchandising Council (MCMC) and the Missouri Soybean Merchandising Council (MSMC) to partner on the monitoring efforts for the RCPP. MCMC and MSMC subcontracted the monitoring work with Waterborne Environmental, Inc. (Waterborne). Waterborne purchased and installed field sampling equipment to conduct the edge-of-field monitoring. Edge-of-field sampling began in 2017. MCGA is providing match from the equipment usage and their time working with landowners and managing the contractors. All 7 paired field sites (15 stations total) are now fully operational and are collecting samples and data. Water quality data collected includes, runoff flow/volume, sediment (TSS), Nitrate (NO2-N + NO3-N), total nitrogen (TKN) and total phosphorus (TP). The primary best management practices included in the study focus on terrace and terrace tile outlets, cover crops, saturated buffers, denitrifying bioreactors and grass waterways and their effectiveness on reducing nutrient loss from agricultural fields. The monitoring sites are utilized for field days and demonstration of benefits from voluntary conservation practices in the state.

Below is a summary of the sites monitored during FFY 2019. This monitoring will continue into late 2022 or early 2023:

- Sites 1 and 2 are located in Moniteau County (HUC #10300102). This site is composed of two paired sites with four monitoring stations total. The practices implemented include grass waterways, terraces and terrace tile outlets, and cover crops planted before soybeans.
- Site 3 is located in Marion County (HUC #07110003). This site has one paired site and two monitoring stations. The practices implemented include grass waterway and annual cover crop.
- Site 4 is located in Shelby County (HUC #07110005). This site has one paired site with two monitoring stations. The practices implemented include terrace tile outlet and cover crop.
- Site 5 is located at the University of Missouri Greenly Research Center in Knox County (HUC #07110003). This site has three monitoring stations to monitor flows entering and exiting each of three practices. The practices implemented include a drainage water management, woodchip bioreactor and saturated buffer.
- Site 6 and 7 is located in the Chariton County Demonstration Farm (HUC #10280202). This site is a collaborative project on the Associated Electric Coop land and includes NRCS, Chariton County SWCD, and the Department. This site has three treatment fields and one control with a total

of four monitoring sites. The practices implemented include different cover crop practices.

Strategy d) The Department's SWCP/319 coordinated with NRCS in selection of NWQI watersheds and will continue using existing monitoring and quality assurance/quality control (QA/QC) approaches in working with NRCS in NWQI watersheds and assisting with state funded conservation practices.

STATUS:
The 319 funded staff actively participated with the NRCS State Technical Committee, the ACWA NPS Workgroup, and NWQI throughout the fiscal year, coordinating on initiatives and working collectively on issues relating to NPS pollution. The FFY 2019 NWQI watershed focus area in Missouri) is Lamar Lake-North Fork Spring River (HUC# 110702070206). This NWQI project obligated a total of $39,534 through three contracts for voluntary conservation practices. In addition is a completed watershed assessment for Headwaters Petite Creek, in Cooper, Moniteau and Morgan counties. NRCS and the Department share monitoring data from conservation practices and other information in NWQI watersheds.

3. **Evaluate and determine existing public programs available that may support NPS efforts.**

Strategy a) Assess existing public programs to see if programs can or are being utilized for appropriate NPS efforts.

STATUS: The department continuously seek opportunities for possible partnerships and collaboration efforts, such as:

- The Jasper County Health Department has a robust bacteria monitoring program. This was identified as an important piece in developing the Spring River WBP (HUC# 10290106) as most of the waters are impaired by bacteria. This data is available from the Jasper County Health Department's website: http://jaspercounty.org/health_department/environmentalservices/streammonitoring_environmental.html
- The Missouri Department of Conservation implementation of land management practices within overlapping priority areas and impaired watersheds. Practices implemented within the critical areas of an EPA accepted WBP are eligible as leveraged activities.

Strategy b) Identify service gaps if possible that are not being met by public programs.

STATUS: During FFY 2018 a Gateway for Community Assistance website was developed. The website provides Missouri communities with customized online access to tools and resources that can help address their environmental compliance and infrastructure planning needs. The gateway includes a comprehensive catalog of tools, resources and services available for wastewater, drinking water, storm water, solid waste, air quality, parks and recreation and more. The tool enables local governments to make informed decisions, save staff time and money, and provide

improved service to their citizens. Find additional information at: https://dnr.mo.gov/gca/.

Strategy c) Identity funding priorities based on stakeholder needs to determine if they can be met with public program services and funds.

STATUS:
This is an ongoing activity and addressed in the efforts described in Goal III, Objective 1 following a watershed framework process. Project sponsors can subcontract or coordinate other services to supplement grant dollars to support activities that may not be eligible for 319 grant funds (e.g., county health departments, municipalities or local governments).

4. **Leverage NPS efforts utilizing various other state, federal, and/or local funds and resources.**

Strategy a) Utilize monitoring data created using other funding sources such as U.S. Geological Survey, 106 Special Monitoring funds, 604(b) Water Quality Management grant funds.

Strategy b) Utilize data already developed by Universities and county health departments.

Strategy c) Enter into MOAs, joint funding or cooperative agreements with other state, federal and local entities to share technical assistance and costs of NPS efforts.

STATUS for Strategies a, b and c:
As mentioned previously in other areas of this report, the Department enters into numerous MOAs with other agencies such as:

- USDA NRCS with the Regional Conservation Partnership Program (see 2. b above in this Goal VII) and contribution agreements to jointly fund technical staff
- MDC to conduct probability-based monitoring (see Mid-Term Goal, Objective 1.)
- U.S. Geological Survey (USGS) through a Joint Funding Agreement (JFA) annually for the past 25+ years to support the state's ambient water quality monitoring network, also called the fixed station network.
- USGS through a Joint Funding Agreement to complete an analysis of the state's ambient water quality monitoring network
- MDC to partner on the Missouri Steam Team efforts, data collection and maintenance, and reporting.

Strategy d) Utilize other federal grant funds where possible for NPS efforts that are eligible under the federal grants (i.e., CWSRF, 106 Water Performance Partnership Grant (PPG), 319 PPG, 604(b) Water Quality Management Planning grant, 104(b) Wetland grants, Farm Bill programs etc.).

STATUS:
The Department continues leveraging funding and efforts to address NPS pollution with the following programs:

Financial Assistance Center and State Revolving Fund
The Water Protection Financial Assistance Center provides funding to communities for water and wastewater infrastructure through the Clean Water State Revolving Fund, the Drinking Water State Revolving Fund and several state grant and loan programs.

Find Clean Water State Revolving Fund (CWSRF) information at: http://www.dnr.mo.gov/env/wpp/srf/. The CWSRF provides low-interest loans to communities for wastewater infrastructure projects. Projects may be new construction or the improvement or renovation of existing facilities. No current CWSRF Program individual awards are directly associated with 319 NPS subgrants, however, the Financial Assistance Center and SRF perform NPS-related activities that contribute to Missouri's overall NPS control efforts. See programs listed below.

The official information on the amount attributed to each cap grant is available in the annual reports http://dnr.mo.gov/env/wpp/srf/wastewater-assistance.htm. The Department continues to consider other eligible NPS projects for financing through the SRF. In addition to stormwater infrastructure projects, projects for agriculture best management practices, protection of wetlands and riparian corridors, and landfill closures are examples of potentially CWSRF eligible NPS projects. Loan recipients for SRF-NPS projects may be governmental, non-profit organizations, private sector entities or individuals if the project is a benefit to water quality and the problem addressed in Missouri's NPSMP.

NPS Animal Waste Disposal Loan Program
The Missouri Agricultural and Small Business Development Authority (MASBDA) manages this NPS loan program designed to provide low interest financing to small producers for design and construction of animal waste treatment facilities http://www.dnr.mo.gov/env/wpp/srf/cwsrf-animal-loans.htm. Individual loans are through MASBDA with CWSRF funding.

NPS Loan Programs and Projects
In the past, the Department awarded CWSRF gnat funds the Upper White River Basin Foundation (UWRBF) to establish a revolving fund to provide below market loan financing and grants to address failing on-site systems. Individuals may apply for funding for failing septic systems in watersheds in southwest Missouri near Table Rock Lake. See additional information about the program on the Ozarks Water Watch Website http://www.ozarkswaterwatch.org/septic-tank-grantloan-program/.

Clean Water Act (CWA) Section 604(b)
CWA Section 604(b) requires each state to receive one percent of the Clean Water SRF grant to carry out planning under the CWA section 205(j) and 303(e). Under CWA Section 205(j) (3), each state must offer and allocate at least 40 percent of its

Clean Water Act Section 205(j) grant to regional public comprehensive planning organizations or appropriate interstate organization. State priority projects is another use for these funds, which the Department administers. RPC and regional councils of government (RPC/COG) within the state are eligible to apply for this funding. The Department currently prioritized the use of 604(b) grant funds offered to RPC Planning Organizations (POs) or Interstate Organizations (IOs) toward projects that evaluate regional partnerships to prevent, control, and/or abate water pollution in a manner that improves the affordability of wastewater treatment services for residents, institutions, and businesses in the study area.

Small wastewater systems often face significant challenges in providing service to their users at a reasonable cost while meeting federal and state regulations. Challenges include aging infrastructure, increasing costs with a small rate base, and limited technical and managerial capabilities. When repairs and upgrades are necessary, financing may prove difficult. Available state and federal grant funds are limited, with federal investment in water and sewer infrastructure reduced almost seventy percent since 1980. For such communities, sharing the burden of providing wastewater services, either through sharing physical infrastructure or through sharing administrative and operational responsibility, may present the most cost-effective solution. A mutually beneficial partnership can be as simple and informal as two or more water systems agreeing to share equipment or buy treatment chemicals together to capture savings from bulk purchases. A more formal partnership could include a contract to share operators or build an interconnection. The systems may also consider transferring ownership or formation of a district to serve those in its boundary.

The Department made funds available for RPCPOs or IOs to conduct feasibility studies to a) connect one or more small wastewater facilities to an existing or new centralized wastewater treatment plant (WWTP); or b) to create a formal entity that allows member communities to share administrative and operational responsibility for wastewater treatment even if not physically connected. Feasibility studies that include economically disadvantaged areas or communities with declining populations receive additional priority in scoring.

The 604(b) RFP provides funds to RPCPOs or IOs to work with community leaders (such as cities, counties, and existing sewer or water districts in the study area) and an engineer to complete a feasibility study. The feasibility study should serve as a decision tool for entities in the study area to understand the potential viability of the project and make the choice to pursue implementation if feasible.

604(b) Projects that received funding in FFY 2019:
A Request for Proposals released in April 2018, resulted in seven proposals received, scored, and three subawards made in November 2018.

1. Northwest Missouri Regional Council of Governments - Nodaway-Holt WWTF Feasibility Study; $78,911.00
2. Mid-Missouri Regional Planning Commission; Cedar Creek Watershed Feasibility Study; $80,776.00
3. Meramec Regional Council of Governments; MRPC Feasibility Study $50,474.00

Hazardous Waste Program (Superfund Sites)
In 1980, the U.S. Congress established the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) (https://dnr.mo.gov/env/hwp/laws/cercla.htm), better known as Superfund. This law passed in response to the indiscriminant disposal of the by-products of industrial life, which contaminated soil and water, resulting in threats to public health and the environment. The federal law provided both response and funding mechanisms for the cleanup of hazardous substance disposal sites. The Superfund Section cleans up contaminated property where releases of hazardous substances occurred in the past or threaten to occur due to past practice. The federal law requires the past polluters, called responsible parties, to pay for the cleanup. The Department's Superfund Section has responsibility for many of these sites.

National Priorities List Sites (NPL)
http://dnr.mo.gov/env/hwp/sfund/npl.htm

- Annapolis Lead Mine, Iron County
- Armour Road, Clay County
- Bee Cee Manufacturing Plant, Dunklin County
- Big River Mine Tailings/St. Joe Minerals, St. Francois County
- Compass Plaza Well TCE, Greene County
- Conservation Chemical Company, Jackson County
- Ellisville, St. Louis County
- Fulbright Landfill, Greene County
- Lake City Army Ammunition Plant, Jackson County
- Lee Chemical, Clay County
- Madison County Mines, Madison County
- Minker/Stout/Romaine Creek, Jefferson County
- Missouri Electric Works, Cape Girardeau County
- Newton County Mine Tailings, Newton County
- Newton County Wells, Newton County
- Oak Grove Village Well, Franklin County
- Oronogo-Duenweg Mining Belt, Jasper County
- Pool's Prairie, Newton County
- Quality Plating, Scott County
- Riverfront Industries, Franklin County
- Solid State Circuits, Inc., Greene County
- Southwest Jefferson County Mining, Jefferson County
- Sporlan Valve Plant #1, Franklin County
- St. Louis Airport/HIS/Futura Coatings, St. Louis County
- Syntex Facility, Inc., Lawrence County
- Valley Park TCE, St. Louis County
- Vienna Wells, Maries County
- Washington County Lead District - Furnace Creek, Washington County
- Washington County Lead District - Old Mines, Washington County
- Washington County Lead District - Potosi, Washington County
- Washington County Lead District - Richwoods, Washington County
- Weldon Spring Former Army Ordnance Works, St. Charles County

- Weldon Spring Quarry/Plant/Pitts (USDOE), St. Charles County
- Westlake Landfill, St. Louis County

EPA's website includes all National Priorities List sites.

Sites Deleted From the NPL
Deletion of a site from the NPL occurs once EPA and the state determine complete implementation of all appropriate response actions and require no further response to protect the human health or the environment.

- Kem-Pest Laboratories, Cape Girardeau County
- North-U Drive Well Contamination, Green County
- Shenandoah Stables, Lincoln County
- Times Beach Site, St. Louis County
- Wheeling Disposal Service Co., Inc., Landfill, Andrew County

Land Reclamation Program
http://www.dnr.mo.gov/env/lrp/index.html

The Land Reclamation Program plays an integral role in protecting and preserving Missouri's land and water resources. The program is responsible for regulating today's mining industry and for correcting health, safety and environmental problems associated with abandoned mines. Historically, nearly 67,000 acres of Missouri lands were left unreclaimed by coal-mining operations and an estimated 40,000 acres were left abandoned through the mining of other commodities. This caused many NPS-related concerns such as acid mine drainage, dangerous high walls, hazardous water bodies, open wells and mine shafts, barren mine spoils, coal waste, soil erosion, stream sedimentation, and channelized streams.

When properly reclaimed, land is again useful for a variety of uses, including agricultural and wildlife areas. Wildlife habitat remains a key concern of the Land Reclamation Program. Whenever possible, abandoned mines are reclaimed with native prairie grasses, trees, and mitigation waters and wetlands that are part of Missouri's history. Reclaiming abandoned mine land (AML) protects the environment by preventing or mitigating toxic or acid mine drainage, groundwater contamination and acid-sediment runoff. In addition to coal mine reclamation, the program has been approved to use funds to close lead and zinc mine shafts throughout the state, although most of these mine shafts are located in southwest Missouri. Following is a summary of the reclamation projects (related to NPS pollution impairments) under construction during FFY 2019.

Brock Farms Reclamation Project:
Spring River Basin watershed - HUC#11070207
On January 24, 2019, Double S Dirt Works, Liberal, Missouri, was given the Notice to Proceed for the Brock Farms Reclamation Project for $1,249,999. This project is located 1.5 miles west of Mindenmines along the Kansas and Missouri State line in Barton County. The project reclaimed approximately 67 acres of abandoned coal mine lands. The primary purpose of reclamation was to eliminate dangerous highwalls, hazardous water bodies, and the polluted water that existed post mining.

The majority of the site was composed of hazardous features that threatened public health and safety along Highway 160 and State Line Road. Reclamation activities also consisted of raising in elevation 1,500 feet of State line road to prevent future inundation from floodwaters. All excavation activities are complete and all disturbed areas are seeded and mulched to control erosion. The Brock Farms Reclamation Project was deemed substantially complete on October 16, 2019.

Water Resources Center
See information on the Department's Water Resources Center at: http://www.dnr.mo.gov/env/wrc/index.html.

The Mission of the Water Resources Center is to administer the development, conservation and use of the state's water resources. The Center's primary role is to provide technical advice and assistance on water use, comprehensive water supply and use planning, ground water, and surface water hydrology.

Collection, maintenance, and interpretation of water resources information is imperative in order for Missouri to respond to environmental and economic problems related to water. Types of issues requiring this kind of information include: interstate water availability and usage, public water well locations, water quality and quantity determinations, drought and flood response and planning, coordination and resolution of river basin issues, major water users data collection, groundwater and surface water contamination potential and prevention, and water use decisions.

Missouri statutory law, Section 640.415, RSMo, directs the Department to "develop, maintain, and periodically update a state water plan for a long-range, comprehensive statewide program for the use of surface water and groundwater resources of the state, including existing and future needs for drinking water supplies, agriculture, industry, recreation, environmental protection and related needs."

Since passage of the Water Resources Law in 1989, the Department undertook studies, collected and analyzed data, held public meetings and conferences, and produced reports, plans and recommendations to address and fulfill the law's water monitoring, supply and use analysis, and planning obligations. The Water Resources Law also directs the Department to ensure public participation in the development and revision of the state water plan and to create a Missouri Water Plan Interagency Task Force to promote coordination among key state agencies. The *Missouri Drought Plan* (Revised 2002) (https://dnr.mo.gov/pubs/WR69.pdf) is an example of statewide water planning and interagency collaboration aimed at serving the needs of Missourians.

Comprehensive State Water Plan
See Missouri's current water plan at http://dnr.mo.gov/geology/wrc/statewaterplanMain.htm. The Department recently began the process of updating and completing a comprehensive State Water Plan for Missouri. See information on the update to the Missouri Water Plan at http://dnr.mo.gov/mowaterplan/.

Missouri Water Resource Law (Section 640.415, RSMo) charges the Department of Natural Resources with the responsibility to develop, maintain, and periodically update the Missouri Water Plan. Missouri's Water Plan is a long-range, comprehensive program, developed with stakeholder engagement and support, to ensure that the quality and quantity of water resources will meet the future needs of Missouri's citizens, businesses, industries, and environment. Development of the Missouri Water Plan took place over an approximately 24-month period, concluding in fall 2019. The Department requested the input of Missouri's citizens and water resource stakeholders during this process, which is vital to producing a State Water Plan that clearly identifies our state's priorities for water resource development for the future.

Goals for the update to the Missouri Water Plan include the following actions and outcomes.

- Engage public and stakeholder forums; gather public input to help identify needs and priority areas of water resource development.
- Establish key stakeholder advisory and technical groups to guide us during water plan development.
- Develop an updated evaluation of current groundwater and surface water availability and develop projected water supply demands.
- Produce an in-depth analysis of current and future consumptive and non-consumptive water demands, and identify gaps in water availability based on water demand projections.
- Identify municipal, agricultural, industrial, and environmental infrastructure needs, and evaluate funding and financing opportunities.
- Recognize water quality needs and asses how this affects water availability and existing water uses.
- Understand the areas where developing new and more sustainable water sources, better infrastructure, and more integrated water supplies, can help sustain water delivery in a dynamic climate.
- Understand regionally where future water gaps may exist, as studies have revealed in parts of southwest and northern Missouri.

Another document developed by the Water Resources Center (WRC) is the
Missouri Wetland Program Plan for 2013 – 2018
(http://dnr.mo.gov/geology/wrc/docs/Missouri_Wetland_Program_Plan.pdf)

Wetland Research and Protection

Since 1988, Missouri's Water Resources Center and EPA Region 7 collaborated on wetland research and protection projects. In recent years, EPA approached states on the need for more focus and better use of resources to enhance wetland protection and restoration efforts. WRC received federal cost-share support to facilitate the *Missouri Wetland Program Plan 2013 – 2018* using EPA's Core Elements Framework (CEF) (http://dnr.mo.gov/geology/wrc/docs/Missouri_Wetland_Program_Plan.pdf). This plan was possible with the cooperation and consultation of the contributors listed below.

List of Contributors

Missouri Department of Natural Resources

Missouri Department of Conservation
Missouri Department of Transportation
Natural Resources Conservation Service
United States Fish and Wildlife Service
United States Geological Survey
University of Central Missouri
University of Missouri - Columbia
Ducks Unlimited (Missouri)
Mid-America Regional Council

Water Protection Program Wetland Grant Activity

The EPA has instituted a national effort to encourage and support state and tribal development of wetland water quality standards as part of the Core Elements Framework (CEF) for wetlands programs. As part of its Water Quality Standards triennial review process, the Department will consider establishment of wetland water quality standards. The goal of this project is to establish a set of reference wetlands in Missouri, with potential emphasis on riparian wetlands in floodplains of Missouri and Mississippi River tributaries. Reference wetlands identified in these systems may be a foundation upon which to base wetland water quality standards (appropriate designated uses, numeric criteria to protect those uses, and antidegradation) and establish an Index of Biotic Integrity for wetlands in Missouri.

Wetlands provide key habitats for amphibians, fish, waterfowl, and aquatic invertebrates, while also providing essential ecosystem services for human uses. Reduction of floodplain connectivity, channelization and damming, wetland draining, and human development have dramatically reduced the amount of wetland habitat available in Missouri, leading to degraded conditions and loss of aquatic biodiversity. Remaining wetlands in the state vary in functioning and degree of human impact; however, designated standards for water quality and habitat conditions have not been set for Missouri wetlands.

The EPA instituted a national effort to encourage and support the development of state wetland programs, and identified four core elements that comprise and strengthen effective wetlands programs. One of these core elements is the development of scientifically defensible water quality standards for wetlands. Although there are not water quality standards for wetlands, including wetland-specific designated uses, criteria to protect those uses, and a dataset of classified wetlands to which these uses and criteria would apply.

“A lack of water quality and other supporting data necessary to classify and identify certain wetland uses currently precludes development of wetlands-specific numeric water quality criteria at this time.” This is only partially true. Although the Department does not have the data to develop wetlands numeric criteria, there are plans to develop wetlands-specific narrative criteria in the next rulemaking. The standards added information for designated uses for wetlands and additional data used to further identify and revise these wetland uses.

STATUS:

The Department continues to do follow-up monitoring of the wetlands identified by the grant.

IV. Conclusion: Future Efforts

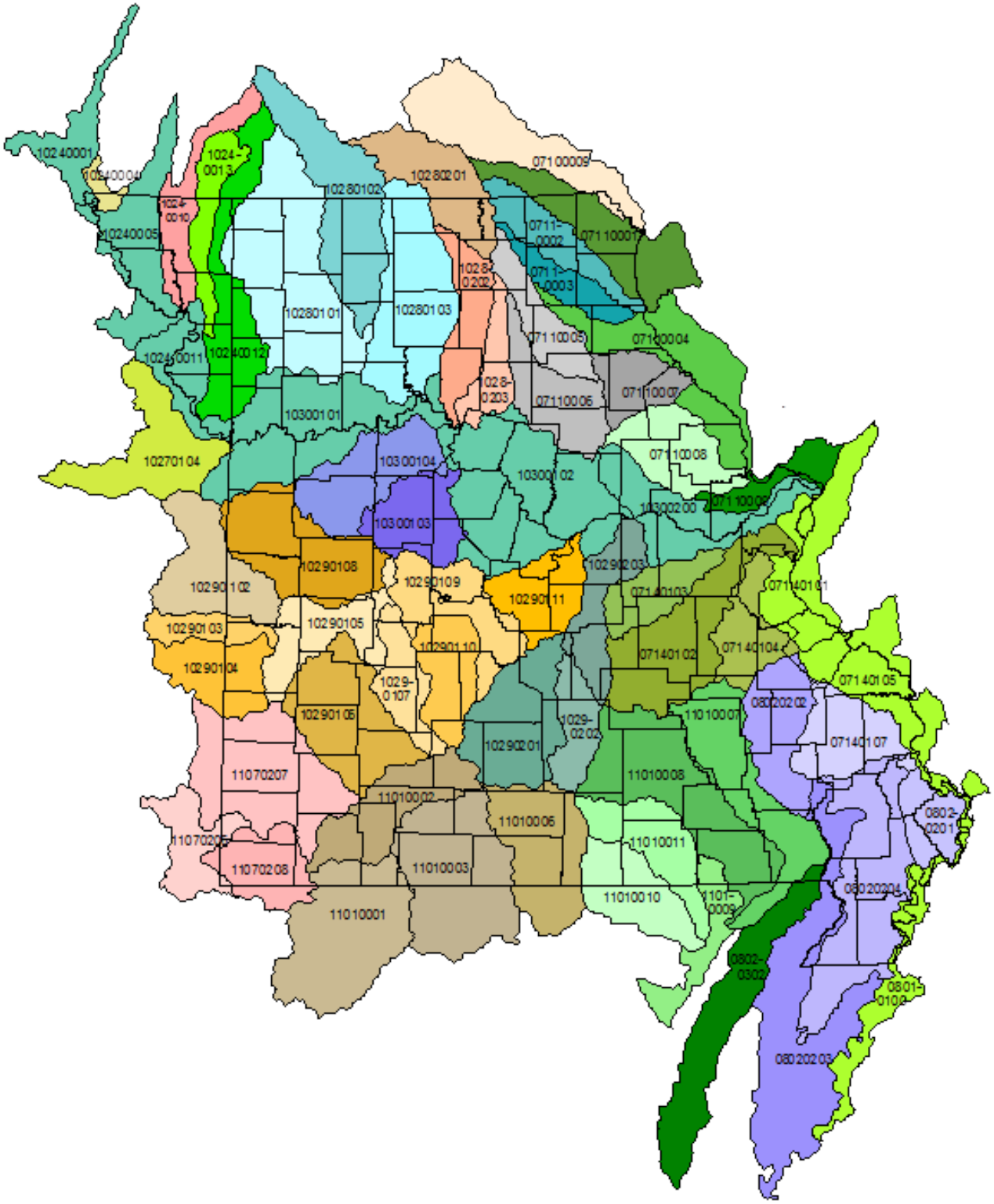
Missouri has adopted the 2013 Section 319 Nonpoint Source Program Guidance into the NPSMP and the format of this annual report changed to include and address the goals and strategies of the NPSMP.

Watersheds for FFY 2018 and into FFY 2019 that are high priority for the Department include the following watersheds: Lower Grand River, Big River, Spring River (the first three pilot watersheds), Missouri River corridor watersheds (Independence-Sugar, Lower Missouri, Lower Missouri-Cooked, Lower Missouri-Moreau), Salt River Basin (North Fork Salt, South Fork Salt, and Salt), Meramec, Niangua, Sac, and Upper Mississippi – Cape Girardeau.

The Department and its stakeholders continue to implement a watershed approach for addressing NPS pollution in accordance with Missouri's NPSMP and the Section 319 NPS Guidance. The Department anticipates continued success in the use of a variety of funding sources to improve water quality, while concurrently improving upon reporting and evaluation measures for the NPS Program as specified in the NPSMP.

Please direct questions regarding this report or other NPS management issues in Missouri to Trish Rielly, Missouri Department of Natural Resources, Soil and Water Conservation Program, P. O. Box 176, Jefferson City, MO 65102, by phone at (573) 526-4662 or by email at trish.rielly@dnr.mo.gov.

Appendix A - Missouri Hydrologic Unit Delineations by 8-digit Hydrologic Unit Code.



Missouri Watersheds: HUC 8, USGS Basin Name, and Missouri Basin Name

	USGS Basin Name	Missouri Basin Name
07100009	Lower Des Moines	Des Moines Basin
07110001	Bear-Wyaconda	Wyaconda - Fox Rivers
07110002	North Fabius	North Fabius River Basin
07110003	South Fabius	South Fabius River Basin
07110004	The Sny	North River - Bobs Creek
07110005	North Fork Salt	North Salt River Basin
07110006	South Fork Salt	Middle-South Forks of the Salt River
07110007	Salt	Lower Salt River Basin
07110008	Cuivre	Cuivre River Basin
07110009	Peruque-Piasa	Peruque-Dardenne Creeks
07140101	Cahokia-Joachim	Mississippi River Tribs - St. L-Ste. Gen
07140102	Meramec	Meramec River Basin
07140103	Bourbeuse	Bourbeuse River Basin
07140104	Big	Big River Basin
07140105	Upper Mississippi-Cape Girardeau	Mississippi River Tribs - Ste. Gen-Cape Gir.
07140107	Whitewater	Castor-Whitewater Rivers Basin
08010100	Lower Mississippi-Memphis	Mississippi River Mainstem Below Ohio River
08020201	New Madrid-St. Johns	St. Johns Bayou
08020202	Upper St. Francis	Upper St. Francis Basin
08020203	Lower St. Francis	Lower St. Francis Basin
08020204	Little River Ditches	Little River Ditches
08020302	Cache	Cache River Basin
10240001	Keg-Weeping Water	Missouri River Bottom
10240004	Nishnabotna	Nishnabotna River Basin
10240005	Tarkio-Wolf	Tarkio-Squaw Tributaries Basin
10240010	Nodaway	Nodaway River Basin
10240011	Independence-Sugar	Missouri River Mainstem
10240012	Platte	Platte River Basin
10240013	One Hundred and Two	102 River Basin
10270104	Lower Kansas	Kansas River Basin
10280101	Upper Grand	Upper Grand River Basin
10280102	Thompson	Thompson River Basin
10280103	Lower Grand	Middle Grand River Basin
10280201	Upper Chariton	Upper Chariton River Basin
10280202	Lower Chariton	Lower Chariton River Basin
10280203	Little Chariton	Little Chariton River Basin
10290102	Lower Marais Des Cygnes	Maries des Cygnes River Basin
10290103	Little Osage	Little Osage River Basin
10290104	Marmaton	Marmaton River Basin
10290105	Harry S. Truman Reservoir	Upper Osage River Basin

	USGS Basin Name	Missouri Basin Name
10290106	Sac	Sac River Basin
10290107	Pomme De Terre	Pomme de Terre River Basin
10290108	South Grand	South Grand River Basin
10290109	Lake of the Ozarks	Lake of Ozarks Basin
10290110	Niangua	Niangua River Basin
10290111	Lower Osage	Lower Osage River Basin
10290201	Upper Gasconade	Upper Gasconade River Basin
10290202	Big Piney	Big Piney River Basin
10290203	Lower Gasconade	Lower Gasconade River Basin
10300101	Lower Missouri-Crooked	Missouri River Mainstem - KC to Glasgow
10300102	Lower Missouri-Moreau	Missouri River Mainstem - Glasgow to Hermann
10300103	Lamine	Lamine River Basin
10300104	Blackwater	Blackwater River Basin
10300200	Lower Missouri	Missouri River Mainstem - Hermann to St. Louis
11010001	Beaver Reservoir	Table Rock Lake Basin
11010002	James	James River Basin
11010003	Bull Shoals Lake	Bull Shoals Lake Basin
11010006	North Fork White	North Fork White River Basin
11010007	Upper Black	Black River Basin
11010008	Current	Current River Basin
11010009	Lower Black	Fourche Creek Basin
11010010	Spring	Spring River Basin (Howell/Oregon counties)
11010011	Eleven Point	Eleven Point River Basin
11070206	Lake O' the Cherokees	Cherokees Lake Basin
11070207	Spring	Spring River Basin
11070208	Elk	Elk River Basin

Appendix B – The Department's Monitoring Schedule for SFY 2019 and SFY 2020

A summary of the work provided in the 319 PPG work plan is below. Additional information about Missouri's monitoring program is located on page 6 of *A Proposal for A Water Quality Monitoring Strategy for Missouri (FFY 2015-2020).*

1. State Parks – Outstanding Waters – 5 sites monitored 3 times per year (chemical analyses only)
2. Current or potential NPS impaired areas
    a. 7-9 sites, 5 samples per recreation season for nutrients and bacteria
3. Nutrient Criteria Development
    a. 19 sites, 6 samples per fiscal year
4. TMDL Development
    a. 13 Sites, 6 samples per recreation season for nutrients and bacteria
5. 319 Watersheds
    a. Black Creek – 1 – site, 5 times per rec. season
6. Wadeable Streams Monitoring for background and nutrients
    a. 319/AML Monitoring
        i. 3 sites, 4 times per year
        ii. 3 sites, 6 times per year
        iii. 7 sites, 2 times per year
        iv. 2 sites, 4 times per year
        v. 13 sites, 2 times per year
        vi. 1 site, 4 times per year

Conduct sediment monitoring (Sediment QAPPs 2018, 2019, & 2020)

1. 10-12 sites monitored for sediment chemistry

Provide a zip file of SFY 19 and SFY 20 QAPPs upon submission of this report. The QAPPs provide an overview of the sites, frequency, and parameters monitored is located near the end of each QAPP.

Appendix C – Statewide Lakes Assessment Program Lake List

See included zip file of SFY 19 QAPPs. The list of lakes for 2018-2019 Statewide Lakes Assessment Program are included in the QAPP.

Statewide Lake Assessment Program's Primary Lake List – monitored each summer.

MU#	LAKE	COUNTY	MU#	LAKE	COUNTY
133	Forest	Adair	87	Brookfield	Linn
89	Truman	Benton	48	Long Branch	Macon
117	Little Dixie	Callaway	149	Lake Ozarks	Miller
118	Rain Tree	Cass	184	Manito	Moniteau
70	North		180	Bilby Ranch	Nodaway
93	Stockton	Cedar	181	Mozingo	
182	Fox Valley	Clark	179	Nodaway Co.	
72	Smithville	Clay	110	Little Prairie	Phelps
74	Watkins Mill		3	Bowling Green #1	Pike
96	Fellows	Greene	145	Mark Twain	Ralls
185	Harrison Co.	Harrison	36	Clearwater	Reynolds
92	Pomme de Terre	Hickory	7	Kraut Run	St. Charles
186	Bismark	Iron	91	Atkinson	St. Clair
39	Council Bluff		18	Capri	St. Francois
183	Hazel Hill	Johnson	112	Shayne	
114	Henry Sever	Knox	150	Blind Pony	Saline
121	Higginsville	Lafayette	115	Hunnewell	Shelby
57	Deer Ridge	Lewis	98	Table Rock	Stone
5	Lincoln	Lincoln	30	Wappapello	Wayne

Statewide Lake Assessment Program's Secondary Lake List

MU#	LAKE	COUNTY	MU#	LAKE	COUNTY
131	Hazel Creek	Adair	14	Tishomingo	Jefferson
50	Spring		15	Wauwanoka	
224	Happy Holler	Andrew	157	Holden City	Johnson
200	Savannah City		55	Baring	Knox
190	Charity	Atchison	221	Edina (Sect 7)	
61	Vandalia	Audrain	56	Edina City	
245	White		223	Greenly Farm	
257	Whitesell		162	Maple Leaf	Lafayette
94	Lamar	Barton	64	Odessa	
243	Pin Oak		273	Odessa Upper	
261	Adrian City	Bates	113	Pape/Concordia	
189	Butler		222	Ewing	Lewis
159	Harmony Mission		129	LaBelle City 2	
219	Dairy 1	Boone	58	Wakonda	
232	Lick Creek		239	New LaBelle	
241	Phillips		202	Whiteside	Lincoln

MU#	LAKE	COUNTY	MU#	LAKE	COUNTY
41	Rocky Fork		218	Bucklin City	Linn
42	Tri-County	Boone	192	Jo Shelby	Linn
187	Belcher Branch	Buchanan	233	Linneus	
31	Beaver	Butler	139	Marceline City	
79	Breckinridge City	Caldwell	191	Indian Creek	Livingston
78	Hamilton City		242	Pike	
216	Big Whetstone	Callaway	245	Poosey 17	
1	Glover		231	LaPlata west	Macon
236	McCredie		130	LaPlata	
267	Niangua	Camden	49	Macon	
26	Bella Vista	Cape Girardeau	250	Santa Fe	
27	Boutin		268	Nims	Madison
28	Girardeau		24	Fredricktown	
35	Miller	Carter	85	Marie	Mercer
144	Pinewoods		84	Paho	
158	Amarugia High.	Cass	60	Monroe	Monroe
365	Drexel City		2	Pinnacle	Montgomery
366	Garden City		256	Wellsville	
69	Harrisonville		12	Ben Branch	Osage
120	Winnebago		101	Norfork	Ozark
88	Marceline	Chariton	25	Perryville	Perry
45	Nehai Tonkayea		63	Spring Fork	Pettis
244	Pine Ridge		62	Westmoreland	
119	Sterling Price		4	Bowling Green 2	Pike
255	Waterhshed Lake	Clark	270	Vandalia Reserv.	
73	Rocky Hollow	Clay	253	Tobacco Hill	Platte
77	Allaman	Clinton	52	Thunderhead	Putnam
13	Binder	Cole	51	Mahoney/Unionville	
258	Winegar		238	Monroe Rte J	Ralls
248	Prairie Home 2	Cooper	272	Perry	
111	Indian Hills	Crawford	225	Higbee	Randolph
134	Jamesport City	Daviess	226	Higbee City	
228	Jamesport Comm.		199	Rothwell	
140	Cameron 1	DeKalb	46	Thomas Hill	
211	Cameron 2		194	Lawson City	Ray
213	Cameron 3		198	Ray County	
212	Grindstone		37	Lower Taum Sauk	Reynolds
163	King		33	Fourche Creek	Ripley
82	Maysville		32	Ripley	
81	Pony Express		132	Lancaster City	Schuyler
203	Willow Brook		54	Ella Ewing	Scotland
107	Macs/Ziske	Dent	141	Show Me	
108	Shawnee/Turner	Dent	53	Memphis	Scotland
102	Noblet	Douglas	29	Tywappity	Scott
10	Northwoods	Gasconade	109	Loggers	Shannon

MU#	LAKE	COUNTY	MU#	LAKE	COUNTY
11	Pleasant Valley		128	Clarence West	Shelby
229	King City	Gentry	178	Daniel Boone	
195	Limpp		59	Shelbina	
83	Bethany	Harrison	123	Shelbyville	
143	Old Bethany		193	Busch 37	St. Charles
90	Montorse	Henry	197	Prairie	
214	Bennett	Howard	21	Goose Creek	St. Francois
43	D.C. Rogers		152	Lafayette	
44	Fayette		17	Carmel	
104	Simms	Howell	19	Marseilles	
146	Crane	Iron	20	Monsanto	
38	Killarny		16	Timberline	
269	Shepherd Mountain		22	Ann	St. Genevieve
148	Blue Springs	Jackson	23	Wanda Lee	
166	Cat Claw		164	Elmwood	Sullivan
170	Coot		137	Green City	
167	Cottontail		237	Milan north	
169	Gopher		86	New Milan	
165	Jackrabbit		251	Sears Comm.	
116	Jacomo		105	Austin	Texas
196	Lone Jack		106	Roby	
68	Longview		161	Bushwacker	Vernon
67	Lotawana		40	Sunnen	Washington
168	Nell		204	Worth County	Worth
66	Prairie Lee				
65	Tapawingo				

Appendix D - 319 NPS Project Executive Summaries and Grants Annual Performance Report (GAPR) for FFY 2013-2017 ***(as reported by EPA's Grants Reporting and Tracking System)***

319 NPS Project Executive Summaries

Boone County Commission
Greater Bonne Femme WBP Development and Demonstration Project
HUC # 10300102 (103001020902 and 103001020903)

PROJECT DESCRIPTION
Greater Bonne Femme WBP Development and Demonstration project is developing a WBP that contains EPA's nine critical planning elements for the Greater Bonne Femme Watershed (GBFW) which will include Bonne Femme Hydrologic Unit Code (HUC) #103001020902 and Little Bonne Femme (HUC #103001020903) subwatersheds. The plan will help improve and protect water quality in the Greater Bonne Femme watershed by identifying pollutant sources, identifying BMPs to be implemented, setting reachable goals and a timeline for implementation projects, and establishing an evaluation and monitoring program. The project is also implementing a BMP demonstration project to inform the public about practices that address the streams' bacteria impairment, and outreach events to garner watershed stakeholder support for the planning and implementation process. Currently, there are five (5) streams in the GBFW that are on the Clean Water Act Section 303(d) list of impaired waters for exceeding the *E. coli* bacteria water quality standard. The watershed also includes five (5) Outstanding State Resource streams and sensitive karst areas that are extremely vulnerable to water quality degradation, and is sandwiched between two rapidly growing cities.

OBJECTIVES
The primary goals and objectives of this planning project are to:
- Identify the causes and sources of the pollutants in the Greater Bonne Femme Watershed
- Develop recommendations for remedies through identification of BMPs as well as critical areas for their implementation
- Estimate the costs of implementing the BMPs
- Inform the public of the need and necessity of a program to reduce pollutants in the watershed

METHODS EMPLOYED
- Greater Bonne Femme WBP (EPA approved)
  - Public meetings for WBP development
  - Technical Advisory Committee meetings (quarterly)
  - Watershed modeling and analysis
  - Water quality monitoring for WBP development, tracking, and assessment
  - (2) Quality Assurance Project Plans for water quality monitoring and secondary data use (Department approved)
- Outreach activities:
  - (3) Public land management workshops
  - (4) Volunteer water quality monitoring events
  - (2) Water festivals
  - Website development and maintenance
- BMP Demonstration Project (retrofit 2 stormwater detention basins using bioengineering design)
  - Educational sign for BMP Demonstration
  - Demonstration Project field day
- Required reporting:
  - Quarterly Reports
  - Annual Reports
  - Annual FFATA and Minority Business Enterprise/Women Business Enterprise (MBE/WBE) Reports
  - Final Report

COOPERATING AGENCIES
Boone County Commission
USDA Agricultural Research Service
City of Columbia
City of Ashland
Boone County Soil and Water Conservation District
University of Missouri
Missouri Department of Conservation
Natural Resources Conservation Service
Missouri Stream Team

CONTACT

Project Sponsor: Boone County Commission
Project Manager: Lynne Hooper
Boone County Resource Management
801 E. Walnut, Room 315
Columbia, MO 65201
(573) 886-4491
Email address: lhooper@boonecountymo.org

Department Project Manager: Karen Westin
Subgrant #: G19-NPS-01
Project Period: 8/1/2018 – 7/31/2020
FY15 319 Grant: $65,284
FY17 319 Grant: $10,502
Match: $77,534
Total Project Funding: $153,320

Harry S Truman Coordinating Council
Spring River Watershed Planning Support and Coordination Project
HUC # 11070207

PROJECT DESCRIPTION
The project coordinated local planning meetings and obtained input that assisted with the development and implementation of the Spring River WBP. The Harry S Truman Coordinating Council (HSTCC) encouraged and engaged a diverse group of stakeholders to support, guide, and provide input into the development of a 9-element WBP. The project completed a BMP demonstration, and conducted outreach and education activities.

OBJECTIVES
The overall goal of the project was to obtain local stakeholders and other community leader's participation in a planning process to support development of a watershed plan for the Spring River Watershed that addressed the nine critical elements of a WMP as identified by EPA. Implementation of the watershed plan consisted of:

1. The development of a Watershed Implementation Committee
2. Identified focus areas in the North Fork of Spring River and Lamar Lake subwatersheds for implementation
3. Assisted the Committee with applying for and obtaining funding for implementation
4. Served as a lead administrative or fiscal support agency for NPS source projects

METHODS EMPLOYED
The HSTCC oversaw and administered the Spring River Watershed Planning Support and Coordination project through the following methods:

- Provided a community perspective to the planning process and assisted with local public meetings,
- Attended and supported KSU led stakeholder meetings, and
- Provided direct mailings and other means to obtain stakeholder participation.
- Worked with major urbanized communities and other Regional Planning Commissions (RPCs) to provide KSU with urban NPS concerns, priorities, BMPs, and known critical source areas.
- Utilized community volunteers and project staff, to complete a urban BMP demonstration project to help slow and capture stormwater runoff from a ball field and parking areas that feeds into impaired Lamar Lake.
- Submitted quarterly progress reports, reports on numbers and affiliations of project participants, and submitted the final WMP for Department and EPA acceptance.
- Posted the Spring River WBP to the HSTCC website to help promote public awareness about the WBP.

METHODS EMPLOYED

- WBP
- 4 Public/stakeholders meetings for WMP development
- Presentations
- Web page updates
- E-mail Updates
- Raingarden Demonstration
- 3 Demonstration Signs/Interpretive Panels
- 5 Annual Reports
- Quarterly Reports
- Final Report

CONTACT
Project Manager: Jill Cornett, Executive Director
Authorized Representative: Gary Turnes, President of Board
Harry S Truman Coordinating Council
800 E. Pennell St.
Carl Junction, MO 64834
(417) 649-6400
E-mail: jcornett@hstcc.org

Dept. Project Manager: John Johnson
WBP Grant #: G12-NPS-05
Project Period: March 15, 2013 – December 31, 2018
FY08-09 319 Grant: $30,000
FY14 319 Grant: $41,000
Match: provided by Missouri Parks, Soils & Water Sales Tax
Total Project Funding: $71,000

Missouri Botanical Garden (MBG)
Missouri Botanical Garden Deer Creek Watershed Initiative Project - Phase III
HUC # 07140101

PROJECT DESCRIPTION
The Deer Creek Watershed Initiative Project - Phase III was a continuation of the previous Phase II project conducted by the MBG and other partners. The project focused on improving the aquatic life beneficial use in three tributaries of Deer Creek (Denny, Pebble, and Monsanto-Sunswept creeks). The grant funds supported the implementation of stream bank bio-stabilization projects and innovative stormwater demonstration projects within the Deer Creek watershed. A riparian corridor restoration and stormwater BMP cost-share program was also developed and implemented that assisted approximately 80 landowners with implementing practice solutions to improve the stream water quality. The education and outreach program increased local citizen's awareness of stream problems and practice solutions to maintain healthy streams in an urban environment. Macroinvertebrate stream monitoring identified aquatic life improvements while BMP modeling provided pollutant load reduction estimates resulting from BMP implementation.

OBJECTIVES
1. Decrease erosion, sedimentation and other NPS pollutants by capturing and infiltrating stormwater runoff.
2. Protection of streams and groundwater from chloride.
3. Reduce bacteria pollution in the watershed related to animal waste.
4. Reduce water pollution caused by yard waste and organic debris.

METHODS EMPLOYED
- Case study brochures
- QAPP development
- Water quality data reports
- Website updates
- Social media Updates
- 30 Email Newsletters
- 3 RFQs or bid documents
- 4 Project plans (design and construction)
- 39 Rainscaping landowners cost-share meetings
- 199 Rainscaping cost-share projects
- 75 Rainscaping project signs
- 7 Rainscaping Maintenance Training Workshops
- 0.40 acres Livestaking (trees and shrubs)
- 1,849. linear ft. Riparian corridor restoration
- 29,900 sq. ft. Innovative stormwater demonstration
- 5 Rain garden bioretention
- 23 In-stream grade/habitat structures
- 1,819 linear ft. Streambank restoration & stabilization
- Honeysuckle Sweep Riparian Maintenance
- 5 Load reduction estimates reports
- Required reporting (e.g., fiscal invoices (19), quarterly (19), annual (5) and final report)

COOPERATING AGENCIES
- St. Louis Metropolitan Sewer District
- City of Frontenac
- East-West Gateway Council of Governments
- Chaminade College Preparatory School
- Mary Institute and St. Louis Country Day School (MICDS) Preparatory High School
- Deer Creek Watershed Alliance
- Missouri Department of Natural Resources

CONTACT
Project Manager: Glenda Abney, Direct, Earth Ways Center
Authorized Representative: Bob Woodruff
Missouri Botanical Garden
P.O. Box 299
St. Louis, MO 63166
(314) 577-0279
Email: Glenda. Abney@mobot.org

Dept. Project Manager: John Johnson
Subgrant #: G14-NPS-04
Project Period: January 1, 2015 – December 31, 2019
FY12 319 Grant: $571,501.45
FY13 319 Grant: $ 62,139.56
FY14 319 Grant: $685,309.84
FY16 319 Grant: $29,009.15
Match: $898,640.00
Total Project Funding: $2,246,600.00

Schuyler County Soil and Water Conservation District
North and Middle Fabius Water Quality Improvement Project – Phase II
HUC # 07110002

PROJECT DESCRIPTION
The Schuyler County Soil and Water Conservation District (the District) successfully completed the North Fabius Water Quality Improvement Project (Phase I; funded with 319 FY06 & 07). The project goal was to reduce water quality impairments through the implementation of BMPs, such as, alternative livestock watering sources, management intensive grazing systems, bank vegetative buffers, nutrient/pest management plans, dry hole systems, decommissioning private wells, and constructing an animal waste facility. Phase II of this project continued to focus on agricultural practices utilizing the Soil and Water Conservation Program's Practice Standards along with revising the 9-element plan required by the EPA.

OBJECTIVES
The goal of the project is to implement BMPs to improve water quality, decrease soil erosion, and improve aquatic life through the following activities:

1. Best Management Practices: Stream Protection (WQ-10) Practices; Prescribed Grazing Systems; Management Intensive Grazing Systems; Dry Hole Systems under Erosion and Sediment Control Structures and Terraces with grass outlet under Erosion and Sediment and Control Structures (quantity depends on size of practices and funding available).
2. Water Quality Monitoring: Three sites on North and Middle Fabius with load reduction reporting.
3. Project Focused Education: Project specific HUC 12 watershed color maps (approx. 20" x 20"); NPS Focused Newsletters; Managed Intensive Grazing School; and NPS focused BMP tour.
4. North and Middle Fabius Watershed Plan Update - Subcontract with the University of Missouri, to complete watershed modeling along with ground-truthing to address any changes in land use, pollutant sources, critical areas and required BMPs needed to address the stream impairment.

METHODS EMPLOYED
- 3 Stream Protection WQ-10 Practices
- 3 Prescribed Grazing Systems
- Dry Hole Systems under Erosion and Sediment Control Structures
- Terraces with grass outlet under Erosion and Sediment and Control Structures
- 3 Intensive Grazing Systems
- 15 samples over project period at three sites
- 4 HUC 12 watershed maps
- 12 NPS Focused Newsletters
- Managed Intensive Grazing School
- Quality Assurance Project Plan
- North Fabius Watershed-based Plan update
- Quarterly Reports; Annual Reports
- Minority Business Enterprise / Women Business Enterprise (MBE/WBE) Reports
- Updates North and Middle Fabius watershed plan
- Final Report

CONTACT
Project Sponsor: Schuyler County Soil and Water Conservation District
Board Chairman: Mr. Edgar Berry
200 Green Street; PO Box 249
Lancaster, MO 63548
(660) 355-4460

Project Manager: Ms. Darla Campbell
University of Missouri – Extension
campbelld@missouri.edu
(660) 457-3469

Dept. Project Manager: John Johnson
Subgrant #: G14-NPS-01
Project Period: March 1, 2014 – October 31, 2020

FY13 319 Grant: $176,285.44
FY16 319 Grant: $ 62,139.56
FY11 604(b) Grant: $15,000.00
FY12 604(b) Grant: $13,388.00
Match: provided by Parks, Soils and Water Sales Tax
Total Project Funding: $266,813

Watershed Committee of the Ozarks
Little Sac Restoration and Improvement Project
HUC # 102901060404

PROJECT DESCRIPTION
The Little Sac Restoration and Improvement Project reduced pollutant loading as identified in the TMDL for the Upper Little Sac River through the implementation of BMPs to improve water quality, decrease soil erosion, and improve aquatic life. Types of BMPs include: prescribed grazing systems, vegetative buffer strips, and a demonstration longitudinal peaked stone toe protection (LPSTP) streambank stabilization practice. The project efforts were evaluated to determent the effectiveness of the BMPs through water quality monitoring conducted by City Utilities of Springfield at at five sites on the Upper Little Sac River and its tributaries with associated costs documented as match. The project also updated the 9-element WBP for the Upper Little Sac River, originally completed in 2010.

OBJECTIVES
The project implemented best management practices (BMPs) to improve water quality, decrease soil erosion, and improve aquatic life. The project also conducted water quality monitoring, NPS/project-specific educational activities and updated the WBP for the Upper Little Sac.

METHODS EMPLOYED
- Upper Little Sac WBP update
- Quality Assurance Project Plan (QAPP)
- Memorandum of Understanding (MOU) with City Utilities for water quality sample analysis and load duration method development
- Develop contracts with landowners for project BMPs
- 3 prescribed grazing systems
- 1 Longitudinal Peaked Stone Toe Protection (LPSTP) Practice
- Vegetative Buffer Strips
- 2 canoe tours of the watershed
- 1 project specific HUC 12 watershed factsheet
- 3 press releases and newsletters
- 1 project website
- Quarterly, Annual, and Final Reports
- Water quality monitoring at selected sites
- Analysis of trends, and data overview supplied annually to DNR
- Presentations

PROJECT PARTNERS
- Greene County Soil and Water Conservation District
- Springfield City Utilities Laboratory
- Missouri State University
- Missouri Department of Conservation
- Missouri Stream Team Volunteers
- Watershed Landowners

CONTACTS
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Watershed Committee of the Ozarks
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MDNR Project Manager: Andrea Mayus
Subgrant #: G14-NPS-02
Project Period: April 1, 2014 – May 31, 2019

FY11-319 Grant	$95,736.39
FY13-319 Grant:	$255,551
FY15-319 Grant:	$26,446
FY16-319 Grant:	$2,70.85
Match:	$225,222
Total project cost:	$605,664

Missouri Corn Merchandising Council
Agricultural Edge of Field Monitoring
Regional Project

The Department committed $1,000,000 from Section 319 grant funding for monitoring efforts in partnership with the USDA, RCPP. The funding provided support where monitoring is not an eligible cost under the USDA RCPP.

PROJECT DESCRIPTION
The Department entered into this cooperative agreement with the Missouri Corn Merchandising Council (MCMC) in partnership with the Missouri Soybean Merchandising Council. The project formed a collaborative monitoring partnership to conduct farm-scale edge-of-field agricultural runoff monitoring of nutrients and sediment to study the effectiveness and to demonstrate benefits of agricultural conservation practices and to support water quality efforts aimed at meeting state soil and water stewardship goals.

Edge-of-field monitoring provides a way for farmers to monitor the runoff leaving their fields. The project established monitoring stations in a farmer owned crop field to allow the farmer, as well as collaborating partners and agencies, to collect and monitor water samples and hydrologic data to study the effectiveness of agricultural practices. The edge-of-field monitoring provides information about the amount of runoff, soil, and nutrients moving off a given field into an adjacent waterway as well as how rainfall patterns can affect these processes.

OBJECTIVES
Edge-of-field water quality monitoring of relevant BMPs provides power in data, analysis, and communication of critical information that supports historical, current, and future recommendations and guidance of water quality improvement strategies. Specifically, nutrient and sediment load characterization at the edge-of-field scale demonstrate reduction efficiency associated with management recommendations.

The edge-of-field water quality monitoring targeted regionally-representative locations to allow results can be easily extrapolated. Design and site selection are key to edge of field monitoring programs. The project developed suit of questions to be answered and analyses conducted. Data analysis focused on substantiating nutrient and sediment loading efficiency rates of recommended (and to some degree adopted) BMPs that address nutrient and sediment loss reduction strategies such as: vegetative filter strips, grassed waterways, constructed wetlands, terraces, tillage, grazing, crop rotations, manure management, field borders, subsurface tile, riparian buffer strips, cover crops, and in some cases combinations of such practices. A further analysis will identify the extent to which BMPs could function in ungaged locations. Data analysis from this monitoring program will inform numerical simulation(s), such as the APEX model, to support BMP recommendations as well as to document expected reduction/water quality improvement of existing BMPs.

BMPs were implemented in a wide array of circumstances for the purpose of conserving soil and water integrity and improving the sustainability of production agricultural methods. In an attempt to understand the extent and impact of practices approximately seven farms located in Missouri, representing typical Missouri row crop farming practices, were identified and selected for implementation of the edge-of-field monitoring study. As part of the study, a field approach was utilized, comparing two similar fields/plots at each of the seven locations: one containing an identified BMP and the other employing conventional methods. Aside from the differences resulting from BMP implementation, all other factors pertaining to the fields/plots will be as identical as possible.

A water resources contractor with extensive water quality monitoring experience is leveraging in-house capability to implement the most appropriate protocol possible. For the current scope of work, the objectives of this project are as follows:

- Evaluate and verify effectiveness of select agricultural BMPs (or combinations of BMPs) in reducing total nitrogen, total phosphorus, and total suspended solids loads.
- Demonstrate long-term improvements in water quality and soil conservation, when possible, in areas where certain BMPs might be adopted.
- Identify critical cropping system and climate variables that influence in-field soil and nutrient loading in runoff.

- Collect site-specific edge-of-field water quality data that would be used to extrapolate information beyond the current sites to evaluate the extent to which large-scale adoption of BMPs positively affect water quality and associated adoption potential.

METHODS EMPLOYED

- Develop project study plan and standard operating procedures.
- QAPP (department accepted)
- Edge of field site evaluation & selection
- Field equipment selection, preparation & development
- BMP practice installation
- Water quality sampling/data collection
- Quarterly Reports
- Annual Reports
- Minority Business Enterprise/Women Business Enterprise (MBE/WBE) Reports
- Final Report

COOPERATING AGENCIES

Missouri Department of Natural Resources-Soil and Water Conservation Program and Missouri Soybean Merchandising Council

CONTACT

Project Manager: Darrick Steen
Missouri Corn Merchandising Council
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Project Manager: Kurt Boeckmann
Contract Agreement #: G16-NPS-04
Grant Code: 780-0140-4461-3476-W4PD
780-0140-3440-3476-W5PD
780-0140-3440-3476-W6PD
Project Period: April 1, 2016-March 31, 2023

FY14 319 Grant:	$400,000
FY15 319 Grant:	$200,000
FY16 319 Grant:	$600,000
Match:	$237,000
Total project cost:	$1,237,000

* Any remaining required nonfederal matching support will be provided through the department's Soil and Water Conservation Program with revenue generated from the Missouri Parks, Soils and Water Sales Tax.

Lake of the Ozark Watershed Alliance
LOWA LILs and Clean Marina Project
HUC# 102901090407/102901090406

PROJECT DESCRIPTION
The Lake of the Ozarks is a large hydroelectric reservoir created by impounding the Osage River. The Lake is located in south central Missouri in the Salem Plateau of the Ozarks Highlands. It encompasses approximately 8,869,000 acres and drains land from Benton, Morgan, Miller and Camden counties for a total drainage area over 14,000 square miles. Increased urbanization around the Lake has brought water quality concerns to the forefront. To address these issues, The Lake of the Ozarks WBP was developed for the Buck Creek (HUC 102901090406) and Lick Branch (HUC 102901090407) watersheds. The purpose of this project is to implement a subset of strategies from the Lake of the Ozarks WBP to reduce the impact of NPS inputs of these pollutants. Best management practices outlined in the management plan include: rain gardens, rain barrels, swales, native plantings, septic maintenance, and shoreline stabilization.

OBJECTIVES
- Community Bridge Demonstration Project – Stabilize a 1,215ft segment of actively eroding shoreline at the base of the Lake of the Ozarks Bridge by installing riprap along the eroded areas. Pre and post sampling for total suspended sediment will be conducted through the Lakes of Missouri Volunteer Program to establish the effectiveness of riprap installation on reducing sediment loads.
- Riprap Installation within Target Cove – A designated cove with existing water quality data will be saturated with multiple riprap projects to evaluate water quality improvements.
- Septic Tank Maintenance Program – LOWA holds a minimum of two workshops per year to educate local residents on the importance of septic tank maintenance. In addition, LOWA offers a cost share pumpout program to those residents within the targeted watersheds. Eligible residents can apply to receive a $50 discount. Pre- and Post-surveys are given at each workshop to quantify participant knowledge.
- Cost Share Incentive Program – Through this incentive program, homeowners in the project area are eligible to receive cost share to implement LOWA Low Impact Landscapes (LILs) on their property. Participants receive grant funds equal to 20% of the project cost up to a $5,000 project cap, for a maximum of $2,000 per LIL.
- Outreach and Project Promotion – The project efforts are promoted through LOWA LILs demonstration signage, news articles/interviews, newsletters, press releases, workshops, and brochures

METHODS EMPLOYED
- At least 2 septic workshops held annually
- Pre- and post-surveys
- 100 septic tank pumpouts per year
- 6 LOWA LILs per year
- Riprap installation in target cove
- 1,215 shoreline stabilization project
- Water quality monitoring through Lakes of Missouri Volunteer Program
- Community Outreach via news articles, radio interviews, promotional emails, etc.
- Quarterly, Annual, and Final Reports
- Annual Report
- Minority Business Enterprise/Women Business Enterprise (MBE/WBE) Reports
- Final Report

COOPERATING AGENCIES
University of Missouri Extension – Water Quality Program, Lakes of Missouri Volunteer Program, Local Contractors, and Master Gardner and citizen volunteers

PROJECT SPONSOR
Lake Ozarks Watershed Alliance
P. O. Box 836
Sunrise Beach, MO 65079
Donna Swall, Executive Director
(donnamswall@yahoo.com)
573-434-4400

DNR Project Manager: Andrea Mayus
Subgrant #: G17-NPS-03
Project Period: 8/1/2016-7/31/2022

FY14-319 Grant:	$59,000
FY15 – 319 Grant:	$200,000
FY16 – 319 Grant:	$83,000
FY18 – 319 Grant:	$200,000
Match:	$361,333
Total project funding:	$903,333

Wilsons Creek Implementation Project
James River Basin Partnership
HUC # 11010002

Project Description
The "Wilsons Creek Implementation Project" is implementing the Middle James River Sub-basin WBP - Wilsons Creek. The goal of the WBP is to:

- Improve water quality in the targeted sub-basins; reduce total phosphorus (TP) by 4% and total nitrogen (TN) by 7% in the Wilsons Creek watershed within 20 years,
- Facilitate sustainable development by working with residents and cities/counties on allowing and promoting green development practices; and
- Improve the understanding of water quality conditions and pollutant sources, and evaluate the effects of management measures. The project is using the application of multiple BMPs in the targeted areas of the watershed to reduce the loading of NPS pollutants to Wilsons Creek and its receiving water body, the James River. Soil and Water Assessment Tool (SWAT) modeling is being used to conduct BMP applications to areas of the watershed most in need of restoration/remediation.

OBJECTIVES

- Develop a GIS-based layer of "Restoration Opportunity Areas (ROAs)"
- Protect, enhance, and restore riparian areas along Wilsons Creek.
- Provide materials and assistance for detention basin retrofits.
- Provide incentives to reduce the amount of impervious areas in targeted zones,
- Plan and implement a Low Impact Development (LID) conference
- Create and implement an effective educational program
- Encourage continued adoption of large-scale rainwater harvesting

METHOD EMPLOYED

- WBP update
- Project/public meetings
- Quality Assurance Project Plan
- Web site update
- Social media/blog posts
- Target mailing
- Public field days/workshops
- Press releases
- Wilsons Creek clean-up days
- Education materials
- GIS-based map layer
    - Green Infrastructure conference
    - Conservation Easements on 13 acres
    - Riparian Management Plan template
- Missouri Department of Conservation
- Greene County SWCD
- Christian County SWCD
- City and County Governments
    - Nutrient Management Plans
    - Riparian Corridor Enhancement
    - Impervious area reductions
    - Detention Basins retrofits
    - STEPL modeling/BMP load reduction report
    - Macroinvertebrate monitoring (South Creek)
    - Educational Signs
    - Quarterly Reports
    - Annual Reports
    - MBE/WBE Reports

Final Report

COOPERATING AGENCIES

- Ozarks Environmental and Water Resources Institute
- Ozark Greenways

CONTACT
Project Manager: Brent Stock
James River Basin Partnership
901 S. National, PCOB
Springfield MO 65201
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Email address: BrentonStock@MissouriState.edu

State Project Manager: Andrea Mayus
Subgrant #: G17-NPS-06
Project Period: April 1, 2017 – March 31, 2020
FY14 319 Grant $53,760
FY15 319 Grant $190,838
FY17 319 Grant: $306,378
Match: $373,810
Total federal funding: $560,715

James River Planning and Demonstration Project
Southwest Missouri Council of Governments
HUC # 11010002

The James River Watershed, located in southwest Missouri, is approximately 931,050 acres in size. Portions of seven counties (Stone, Christian, Barry, Lawrence, Greene, Webster, and Douglas) drain into the James River and eventually drain into Table Rock Lake. There are approximately 289 miles of streams with permanent flow, 74 miles of intermittent streams and numerous losing streams within the basin. The Ozarks, including the James River watershed, is well known for its karst characteristics. Sinkholes are present throughout the entire basin, especially in the Finley Creek and upper Flat Creek areas.

Project Description
Grant funds support the development of a nine-element WBP for the James River Watershed. The primary target audience are the stakeholders within the James River Watershed. The project is a joint effort between The Board of Governors of Missouri State University on behalf of SMCOG and OEWRI; Ozarks Water Watch (OWW); and James River Basin Partnership (JRBP). Grant funds also support a demonstration septic replacement project.

Objectives
- Develop a WBP for the James River Watershed. The objectives of the nine-element WBP are:
  - Protect and improve water quality in the watershed and Table Rock Lake by identifying pollutant sources and gathering pertinent data.
  - Identify conservation practices to be implemented.
  - Set realistic goals and timeline for implementation.
  - Establish an evaluation and monitoring program to determine success of implemented projects/programs.
  - Increase success of future projects.
  - Help determine where water quality efforts should be focused.
  - Fulfill specific grant application requirements for securing future funding.
  - Assist other organizations and municipalities in water quality related efforts.
  - Provide insight for creation of more efficient implementation and/or education budgets for future projects.

- Implement a demonstration septic replacement project within the Crane Creek – James River Watershed (HUC 1101000205) and the Table Rock Lake – James River Watershed (HUC 1101000206) to remediate failed or poorly functioning septic systems and replace damaged or undersized tanks and/or lateral fields.

Methods Employed
- Develop WBP
- Stakeholder Engagement through public meetings and surveys
- Advisory/Technical Committee meetings
- HUC 12 Watershed Delineation
- TMDL Reduction Analysis
- Nutrient Loading Analysis
- Snapshot Monitoring Event
- Quality Assurance Project Plan
- Septic Remediation Demonstration Projects
- Quarterly Reports
- Annual Reports
- Minority Business Enterprise/Women Business Enterprise (MBE/WBE) Reports
- Final Report

Cooperating Agencies
Board of Governors of Missouri State University on behalf of Southwest Missouri Council of Governments, Ozarks Water Watch, James River Basin Partnership, and Ozarks Environmental Water Resources Institute

Contact

Project Manager: Jason Ray
Southwest Missouri Council of Governments
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Email address: JasonRay@MissouriState.edu

State Project Manager: Andrea Mayus
Subgrant #: G19-NPS-03
Project Period: May 1, 2018 – December 31, 2020

FY15 319 Grant:	$106,991.00
FY17 319 Grant:	$24,509.00
FY18 319 Grant:	$36,611.11
Match:	$112,074.07
Total federal funding:	$280,185.18

Shoal Creek Riparian Restoration and Enhancement Project
The Nature Conservancy
HUC 11070207

Located on the Ozarks Plateau, Shoal Creek [Hydrologic Unit Code (HUC) #1107020707 and #1107020708] is a 66-mile-long tributary of the 2,271 square mile Spring River basin in southwest Missouri. The Shoal Creek watershed consists of 440 square miles in portions of Newton, Barry, Lawrence, and Jasper counties.

Project Description
The Shoal Creek Riparian Restoration and Enhancement Project implemented a portion of the 9-element WBP for the Spring River basin by piloting a riparian corridor protection program with streamside landowners to reduce NPS pollutant loads in high priority sub-watersheds of Shoal Creek. The main project objectives included riparian corridor restoration, riparian corridor enhancements, and landowner workshops. Load reductions for Total Nitrogen, Total Phosphorus, and sediment were calculated using the STEPL model and reported annually to the Department. Preliminary load reductions estimates predict 100-400 lbs/year reduction of nutrients and between 4,000-8,000 tons/year in sediment.

Objectives
- Engagement of streamside landowners on protection opportunities: Identified riparian corridor projects, increased landowner understanding of the benefits of healthy riparian corridors, and gaged landowner acceptance of a range of options for riparian buffer protection.
- Implementation of 3-4 riparian corridor restoration projects: Implementation of streambank stabilization demonstration projects (using bioengineering techniques), riparian buffer establishment, and cattle exclusion/alternative watering practices to reduce nutrient, sediment and bacteria pollutants along perennial stream(s) in Shoal Creek watershed.
- Retention of established riparian corridor system in long-term protection: Identified available to landowners in areas with partially intact natural vegetative cover in riparian corridors, but needed enhancement to become healthy riparian corridor systems. This riparian corridor enhancement component was available to individuals interested in establishing a conservation easement.

Methods Employed
- Stream projects designed and implemented
- At least two informational field days
- Advisory/Technical Committee meetings
- Outreach Materials (newsletters, news releases, brochures, webpage)
- Educational Signs
- Photo Journal
- Minority Business Enterprise/Women Business Enterprise (MBE/WBE) Reports
- Subrecipient Information Form (FFATA)
- Quarterly Reports
- Annual Reports with annual load reduction information
- Final Report

Cooperating Agencies
- Missouri Department of Conservation,
- Soil and Water Conservation Districts,
- Natural Resource Conservation Service,
- Harry S. Truman Coordinating Council,
- Streamside landowners

Contact
Project Manager: Drew Holt
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State Project Manager: Andrea Mayus
Subgrant #: G19-NPS-09
Grant Code: 780-0140-3440-3476-NPAD
FY17 319 Grant: $207,395.00
Project Period: July 1, 2019 – June 30, 2022
Match: $138,283.00
Total federal funding: $345,678.00

MISSOURI DEPARTMENT OF NATURAL RESOURCES

Grant Annual Performance Report (GAPR), Section 319 NPS Program

Missouri . . . FFY 2014 . . . EPA Grant # C9 00740720 . . . Expiration Date 30-SEP-19

Reporting Period: 10-1-18 through 9-30-2019

File Name: MO 2014 Grant, 2019 GAPR oct18--sept19

See the end of this report for abbreviations & definitions.

This report is generated from EPAs Grants Report Tracking System (as known as GRTS)

GRTS #	Project Title	Status Date	*Inserted Date*	Status	showing	Appropriation Year	Project Start Date	Project End Date	Status Comment
01	South Creek Restoration Project - Part 3	09/28/18	*11/20/18*	Completed	active	2014	05/01/2014	*04/30/2017*	The project was successfully completed by the City of Springfield on April 30, 2017 as scheduled. Once the final documentation has been reviewed and approved by the Department, a closeout letter will be submitted to EPA.
01	South Creek Restoration Project - Part 3	11/20/18	*11/20/18*	Completed	active	2014	05/01/2014	*04/30/2017*	EPA was notified that the closeout letter, financial spreadsheet, final report and products are attached in GRTS and ready for their final review to close the project.
02	UMC - OMW, Spring River WMP and Dept Prioritized WS Needs -Part 2	09/30/19	*12/10/19*	Completed	active	2014	04/01/2013	*03/31/2017*	The final report and products have been submitted to the Department. The financial spreadsheet and closeout letter have been attached in GRTS.
03	HSTCC - Spring River Watershed Planning Support and Coordination - Part 2	10/18/18	*10/18/18*	On Schedule	active+	2014	03/15/2013	*12/31/2018*	The project is currently on schedule. HSTCC has been working with DNR staff to develop a 319 implementation project to address NPS sources problems in the critical areas of the North Fork Spring River watershed, focusing on the priority area of the NWQI project that include Lamar Lake (city of Lamar drinking water). A successful kickoff public meeting for the NWQI project was arranged by HSTCC with assistance from the Jasper County SWCD and NRCS.
03	HSTCC - Spring River Watershed Planning Support and Coordination - Part 2	01/15/19	*03/18/19*	Completed	active+	2014	03/15/2013	*12/31/2018*	The project was successfully completed by Harry S. Truman Coordinating Council on December 31, 2018 as scheduled. The Department has received the final report, quarter report, annual report, products and other information needed to close the project. Once the final documentation has been reviewed and approved by the Department, a letter will be submitted to EPA asking that the project be closed.

03	HSTCC - Spring River Watershed Planning Support and Coordination - Part 2	04/10/19	*04/10/19*	Completed	active+	2014	03/15/2013	*12/31/2018*	The project closeout letter, financial spreadsheet, final report and products are attached in GRTS. EPA has been notified that the project is ready for their final review to close the project.
04	UMC - Statewide Lake Assessment Project	09/30/19	*12/12/19*	Completed	active	2014	09/01/2015	08/31/2016	closeout letter and financial spreadsheet attached.
05	UMC - Lakes of Missouri Volunteer Program	09/30/19	*12/12/19*	Completed	active	2014	09/01/2015	08/31/2016	closeout letter and financial spreadsheet attached.
06	MBG - Deer Creek Watershed Initiative Phase III - Part 2	08/05/19	*08/05/19*	Revised	active	2014	02/24/2016	*09/30/2019*	The Department is in the process of approving an amendment to extend the project and budget periods for 3-months, from September 30, 2019 to December 31, 201, to allow time needed for MBG to complete the project Scope of Work. The remaining work to be completed during the 3-months extension period of the subgrant agreement include installation of 12 Rainscape Cost-share BMPs, groundtruthing and field inspections for 12 BMPs, modeling report for the 2019 installed BMPs, a Community Leaders Task Force meeting, a Steering Committee meeting, two project invoices and required final reports (MBE/WBE, quarterly reports, annual report, final report).
06	MBG - Deer Creek Watershed Initiative Phase III - Part 2	11/22/19	*11/22/19*	On Schedule	active	2014	02/24/2016	*09/30/2019*	The project amendment #4 was approved by the Department 10/1/2019 and the subgrant agreement signed by the grant recipient 9/24/2019. The budget and project periods were extended to 12/31/2019.
07	EW Gateway - Lower Meramec River WMP Update	09/30/19	*12/10/19*	Completed	active	2014	04/01/2016	*09/30/2017*	Closeout documents for the FY14 portion of this project have been submitted to EPA and are pending approval.
08	MCMC - Our MO Waters Agricultural Watershed Monitoring	09/19/16	*09/19/16*	Never Initiated	inactive	2014			This is a duplicate listing.

09	MCMC - Our MO Waters Agricultural Watershed Monitoring	03/31/19	*11/26/19*	On Schedule	active	2014	04/01/2016	*03/31/2019*	The FY14 portion of funding for this project has been expended and the grant will be closing. The project will continue under the FY15, FY16, and FY18 319 grants.
10	LOWA LILs and Clean Marina Project	07/17/19	*07/17/19*	On Schedule	active	2014	08/01/2016	*09/30/2019*	This project is being amended to add an additional $283,000 in funding from the FY16 and FY18 319 implementation grants. This amendment will also serve to extend the project out an additional three years, from July 31, 2019 to July 31, 2022. Funding from FY14 funds have been spent in full, as the federal grant expires on September 30, 2019. The previously awarded FY15 funds must be spent in full by August 31, 2020. Due to a lack of community participation the Clean Marina program has been removed from the scope of work for this project. The additional funds will be used to continue implementation of the LOWA LILs and septic maintenance, as well as two new projects designed to stabilize areas of eroding shoreline around the Lake. The shoreline stabilization demonstration project will install riprap along 1,215 linear feet of eroding shoreline adjacent to the Lake of the Ozarks Community Bridge. A pre-selected cove will also be saturated with multiple riprap projects to demonstrate improvements to water quality.
11	JRBP - Wilson's Creek Implementation - Part 1	10/18/18	*10/18/18*	On Schedule	active	2014	*04/01/2017*	*09/30/2019*	The project is currently on schedule. Some of the current accomplishments include a meeting with Greene County Parks to discuss NPS issues in Wilsons Creek, drafting of QAPP, signing of MOU with OEWRI – Missouri State University to conduct water quality monitoring, distribution of a press release about the hydrogeological feature of Wilsons Creek, development of the guidelines for the Lawn Nutrient Management Program packets, LID Conference development, drafting of the Rutledge Wilson Conservation Easement and the drafting of implementation designs for the first detention basin retrofit project by the City of Springfield.

12	MTRCOG Lower Black Creek WMP Implementation	11/20/17	*11/30/17*	Never Initiated	inactive	2014	08/01/2016	*08/31/2017*	Project was terminated and closed with balance of $200,000. The early termination is due to 1) shortage of staff, cause by a high turnover rate; 2) landowners lack of interest in new innovative practices they are not familiar with; 3) stream protection or fencing out cattle is not a huge practice that is implemented in the watershed; and 4) additional funding not needed at this time, since the state cost-share program provide sufficient funding for the implementation of common used agriculture practices in the watershed. The $200, 000 de-obligated funds from the project will be redirected to future watershed efforts. See attachments for project termination and closeout letters.
13	UMC - Statewide Lakes Assessment Project	09/30/19	*12/12/19*	Completed	active	2014	*09/01/2016*	*03/31/2018*	Financial Spreadsheet and closeout letter attached in GRTS
14	UMC - Lakes of Missouri Volunteer Program	09/30/19	*12/12/19*	Completed	active	2014	*09/01/2016*	*03/31/2018*	Project completed. Financial spreadsheet and closeout document attached to GRTS.

Missouri . . . FFY 2014 . . . EPA Grant # C9 00740720 . . . Expiration Date 30-SEP-19

processed with status:	# of projects	% of projects in grant
On Schedule	5	35.7%
Revised	1	7.1%
Completed	8	57.1%
Never Initiated	2	14.3%

(Some projects may have been processed through several statuses; hence,
counted twice; accordingly, the total % may be greater than 100%.
If the category is <blank> that means no status was entered.)

Program	Grant Number	State	Appropriation Year	319 grant	Amount for All Projects	difference	balanced?
C9	00740720	MO	2014	$1,756,000	2,744,127	$0	Yes, the budgets balance.

Missouri . . . FFY 2014 . . . EPA Grant # C9 00740720 . . . Expiration Date 30-SEP-19

Appropriation Year	nth year of grant	% ULO	319 Obligation Amount	319 Available Obligation Amount	319 Expended Amount
2014	5	0%	$1,756,000	$0	$1,756,000

Reference limits ULOs should not exceed in the nth year of a grant
(based on national averages for a 5-year grant,
each state should have its own outlay strategy with lower per cents)

Year - ULO
0 – 100%

1 – 95%

2 – 80%

3 – 58%

4 – 32%

5 – 8%

6 – 0%

Missouri . . . FFY 2014 . . . EPA Grant # C9 00740720 . . . Expiration Date 30-SEP-19

	# of projects	% of projects in grant
active	12	85.7%
inactive	2	14.3%
Grand Total	**14**	**100.0%**

QUALITY ASSURANCE: If 1 or more projects NEED HUMAN ATTENTION, this report is a **DRAFT ONLY**!

A project may be categorized as INACTIVE if prior to this performance period it reached a terminal status (ACCEPTED BY EPA, DISCONTINUED, NEVER INITIATED).

Or a project may be categorized as ACTIVE if at any time during this period it had one of the other statuses. For example, if a project started the period as ON SCHEDULE and midway through the period changed to DISCONTINUED, it counts as a project that was ACTIVE. (The terminal status didn't occur prior to the period, but midway through.)

Sometimes there are anomalies in the GRTS data for a project and it cannot be properly categorized as active or inactive. Any such project is marked NEEDS HUMAN ATTENTION and this report must be considered only a *draft*. Once the problems are fixed and all projects are either active or inactive, then this report may be considered final.

showing = the existing data entries are SHOWING an active project, an inactive project, errs, etc.

active = there is exactly one status entry during the performance period.

active+ = there are 2 or more status entries, this may be something interesting to review.

inactive = in a past time period the project reached terminal status (Never Initiated, Discontinued, or Accepted by EPA). Therefore, this project is properly inactive and there won't be any status entries during the specified performance period.

- -

err 2T = 2 or more terminal status entries, a logical contradiction. For example, Never Initiated means no 319 funds were expended while Discontinued means some part of the 319 funds were spent before the project was cancelled. One project cannot be both.

err A-I = a project cannot both be active and inactive; this would be contradictory. There is a terminal status in the past and there is an active status in this period (or there are several such).

tardy = the status date is after the performance period. If the typing was done after the performance period but the intended effective date of the status was within the period, change the date to within the period. If the intended date was after the period, some additional status entry is needed that has a date within the period and an appropriate status (shuffling will have to be done to get the statuses in the right order).

no data = no statuses have been entered for this project. Enter some.

NSE = the project has one or more status entries, but **N**o **S**tatus **E**ntry within this performance period. An appropriate status, date, and comment may need to be entered for this report to be complete. Or an after-period status that is already entered may have the wrong date and need to be backdated so that it falls within the period. Or there may be some other problem the computer cannot be specific about.

RED + boxed = this GRTS data needs some human attention to update a status, fix an inconsistency, etc.

BLUE + boxed = the status "Not Initiated" is prohibited in Region 7. It should be removed and replaced with the correct status.

For project start or end dates:

Blue italic text represents "Will start on" or "Will be completed on".

Normal text represents "Started on" or "Was completed on".

Note: Inserted Date is in italics so that it won't be confused with the actual status date.

This GAPR lists all statuses & comments that were dated during the reporting period.

In addition it lists the most current status. Listing the current status is needed for inactive projects.
The current status is also needed for active projects that "jumped over" the performance period and

only have entries afterwards. Sometimes, normal active projects may also have after-period entries.

These projects will have in-period statuses listed plus the most current status. This "extra" current status

will be an indicator that there are after-period entries.

The above list of projects was produced by the OBI report titled:

GAPR oct18-sep19

Performance period 10-1-2018 through 9-30-2019.

Date run: 12/12/2019

FILTERS:

Status Date is between **10/01/2018 12:00:00 AM** and **09/01/2019 12:00:00 AM**

or Current Status is equal to / is in **Y**

and State is equal to **MO**

and Appropriation Year is equal to **2014**

The computer uses 12:00 am Feb 15 as the midnight dividing line between February 15 and February 16. Thus, to include Feb 15 in a time frame as a start date, type Feb 15 "02-15-yy". BUT to include Feb 15 as an end date, type Feb 16 "02-16-yy".

To change the performance period dates, edit 40 or so places in the OBI code:

NAME of report,

filter for STATUS DATE,

SHOWING,

Show AIN,

LINE 4, and

File Name

nth year of grant
Subtitle (because it includes dates)

MISSOURI DEPARTMENT OF NATURAL RESOURCES

Grant Annual Performance Report (GAPR), Section 319 NPS Program

Missouri . . . FFY 2015 . . . EPA Grant # BG 99731308 . . . Expiration Date 30-SEP-17

Reporting Period: 10-1-18 through 9-30-2019

File Name: MO 2015 Grant, 2019 GAPR oct18--sept19

See the end of this report for abbreviations & definitions.

GRTS #	Project Title	Status Date	*Inserted Date*	Status	showing	Appropriation Year	Project Start Date	Project End Date	Status Comment
01	FFY2015-2017 Performance Partnership Grant Workplan	09/30/19	*12/11/19*	Completed	active	2015	*10/01/2015*	*09/30/2018*	PPG workplan completed.

MISSOURI DEPARTMENT OF NATURAL RESOURCES

Grant Annual Performance Report (GAPR), Section 319 NPS Program

Missouri . . . FFY 2015 . . . EPA Grant # C9 00740721 . . . Expiration Date 31-AUG-20

Reporting Period: 10-1-18 through 9-30-2019

File Name: MO 2015 Grant, 2019 GAPR oct18--sept19

See the end of this report for abbreviations & definitions.

GRTS #	Project Title	Status Date	*Inserted Date*	Status	showing	Appropriation Year	Project Start Date	Project End Date	Status Comment
01	Spring River NPS WBP Implementation - Part 2	09/28/18	*11/20/18*	Completed	active	2015	04/15/2012	*08/31/2017*	The project closeout letter, financial spreadsheet, final report and produces are attached in GRTS. EPA will be notified that the project is really for closeout.

01	Spring River NPS WBP Implementation - Part 2	11/20/18	*11/20/18*	Completed	active	2015	04/15/2012	*08/31/2017*	EPA was notified that the closeout letter, financial spreadsheet, final report and products are attached in GRTS and ready for their final review to close the project.
02	JRBP - Wilson's Creek Implementation - Part 2	10/18/18	*10/18/18*	On Schedule	active+	2015	*04/01/2017*	*03/31/2022*	The project is currently on schedule. Some of the current accomplishments include a meeting with Greene County Parks to discuss NPS issues in Wilsons Creek, drafting of QAPP, signing of MOU with OEWRI – Missouri State University to conduct water quality monitoring, distribution of a press release about the hydrogeological feature of Wilsons Creek, development of the guidelines for the Lawn Nutrient Management Program packets, LID Conference development, drafting of the Rutledge Wilson Conservation Easement and the drafting of implementation designs for the first detention basin retrofit project by the City of Springfield.
02	JRBP - Wilson's Creek Implementation - Part 2	05/21/19	*06/03/19*	Revised	active+	2015	*04/01/2017*	*03/31/2022*	The Department is in the process of approving an amendment for the project. The amendment will add $140,261 to the current grant award, shifts a partial budget to another grant, extends the project period two years, and updates the schedule of milestones. The overall grant award will also be reduced by $9,739. Funds in the amount of $166,117 from the FY2015 grant will be deobligated and replaced with funds from the FY2017 319 grant. The amendment will extend the project period two years from March 31, 2020 to March 31, 2022 to allow time needed to complete the project scope of work. The milestones completion dates will be revised to help get the project back on schedule. The total revised Section 319 federal award for the project of $550,976, will continue to

									support the project from April 1, 2017 through March 31, 2022. The project will be funded under three Section 319 NPS Implementation grants [FY2014 - $53,760 (expended), FY2015 - $190,838, and FY2017 - $306,378]. The revised work plan (PIP) has been entered in GRTS, and EPA has been notified to obtain approval.
02	JRBP - Wilson's Creek Implementation - Part 2	07/29/19	*08/05/19*	On Schedule	active+	2015	*04/01/2017*	*03/31/2022*	DNR received EPA approval to proceed with the project amended implementation plan
03	USGS James River Monitoring	11/02/18	*11/02/18*	On Schedule	active+	2015	*07/01/2017*	*09/30/2019*	Project on schedule
03	USGS James River Monitoring	09/26/19	*09/26/19*	On Schedule	active+	2015	*07/01/2017*	*09/30/2019*	Project on schedule. All invoices received.
04	LOWA LILs and Clean Marina Project - Part 2	07/17/19	*07/17/19*	On Schedule	active	2015	*08/01/2016*	*08/31/2020*	This project is being amended to add an additional $283,000 in funding from the FY16 and FY18 319 implementation grants. This amendment will also serve to extend the project out an additional three years, from July 31, 2019 to July 31, 2022, however the FY15 funds must be spent in full by August 31, 2020. Due to a lack of community participation the Clean Marina program has been removed from the scope of work for this project. The additional funds will be used to continue implementation of the LOWA LILs and septic maintenance, as well as two new projects designed to stabilize areas of eroding shoreline around the Lake. The shoreline stabilization demonstration project will install riprap along 1,215 linear feet of eroding shoreline adjacent to the Lake of the Ozarks Community

									Bridge. A pre-selected cove will also be saturated with multiple riprap projects to demonstrate improvements to water quality.
05	UMC - OMW,Spring River WMP and Dept Prioritized WS Needs -Part 3	01/29/18	*01/29/18*	Never Initiated	inactive	2015	04/01/2013	*12/31/2017*	The amendment request to extend the project period and add additional funds to the project was denied by the Department, due to change in priorities. The project ended March 31, 2017 as scheduled. The project closed with a balance of $39,708.81, which will be redirected to other eligible NPS projects.
06	WCO - Little Sac Restoration and Improvement Project	05/31/19	*07/12/19*	Behind Schedule	active	2015	04/01/2014	*11/30/2019*	Project has been amended for a no-cost six month time extension to allow for time to complete the WBP for the Upper Little Sac. A draft plan has been submitted to the Department for initial review, but additional time is needed for comments/revisions, as well as EPA review and approval.
07	MCMC - Our MO Waters Agricultural Watershed Monitoring	05/06/19	*11/26/19*	On Schedule	active	2015	04/01/2016	*08/31/2020*	The project has been amended to allow for a no-cost four year time extension from March 31, 2019 to March 31, 2023.The FY15 portion of funding obligated to this project must be spent by 08/31/20, as the federal grant is closing, To date, a total of 352 separate water samples have been analyzed from a total of 17 sampling stations. Sampling will need to be conducted at each site for approximately 5 years in order to obtain a statistically significant dataset. The sites currently have 1-1.5 years of data collection completed. A no-cost, four ear time extension will allow for the remaining sample collection to be completed.
08	UMC - Statewide Lakes Assessment Project	09/30/19	*12/11/19*	Completed	active	2015	*09/01/2016*	*03/31/2018*	Closeout letter to be attached in GRTS
09	UMC - Lakes of Missouri Volunteer Program	09/30/19	*12/11/19*	Completed	active	2015	*09/01/2016*	*03/31/2018*	Closeout letter attached in GRTs

10	TNC - Kiefer Creek Streambank Stabilization and Riparian Improvement Project - Part 1	05/16/19	*12/06/19*	Never Initiated	active	2015	*01/01/2018*	*08/31/2020*	The Project will be funded from the FY2017 and FY2018 319 grants .
11	Black Creek Water Quality Monitoring	10/01/18	*12/10/19*	Completed	active	2015	*06/01/2016*	*10/30/2017*	Sample collection is complete and this project is closed. Water quality monitoring data has been upload in GRTS.
12	Greater Bonne Femme WBP Development and Demonstration - Part 1	11/16/18	*11/25/19*	On Schedule	active	2015	*08/01/2018*	*07/31/2020*	Project started, QAPP submitted.
13	WCO - Little Sac Restoration and Improvement Project _Duplicate Entry	09/07/18	*09/07/18*	Never Initiated	inactive	2015			This is a duplicate entry.
14	City of Frontenac - Georgian Acres Stormwater Improvements though BMP Implementation Project	09/01/18	*11/21/18*	Never Initiated	inactive	2015			This project did not receive Department approval and was never initiated.
15	The James River Planning and Demonstration Project	05/16/19	*05/16/19*	Behind Schedule	active	2015	*05/01/2018*	*12/31/2020*	Project will be amended to shift funds from FY2015 grant to a newer grant to allow time to complete the project efforts. The project was delayed due time shifting the funds from 604(b) to 319 and sponsor gaining access to information saved in Salesforce.
16	TEST huc creation & more	11/13/19	*11/13/19*	Never Initiated	**tardy**	2015			
17	UMC - Statewide Lakes Assessment Project	09/30/19	*12/11/19*	On Schedule	active	2015	*04/01/2019*	*03/31/2020*	Project on schedule. Monitoring completed, sample analyses will be conducted over the winter months with results ready by spring 2020.
18	UMC - Lakes of Missouri Volunteer Program - Coopertive Agreement	09/30/19	*12/10/19*	On Schedule	active	2015	*04/01/2019*	*03/31/2020*	Project is on schedule. A full summer season of water quality sampling completed. Chemical analyses will be completed during the winter of 2020, with water quality data results

									availalable Spring 2020.
19	UMC - Statewide Lakes Assessment Project	09/30/19	*12/11/19*	Completed	active	2015	*04/01/2018*	*03/31/2019*	Project completed. Closeout letters attached to GRTs.
20	Timber Trail to Briar Ridge Channel Project - Part 1	11/22/19	*11/22/19*	On Schedule	active	2015	*10/01/2019*	*09/30/2020*	The project subgrant award was approved by the department 11/8/2019 and signed by the grant recipient 11/6/2019. The PIP was accepted by EPA on 10/19/2019.
21	USGS Joint Funding Agreement for James River Streamgage and WQ Monitoring	09/30/19	*12/10/19*	On Schedule	active	2015	*10/01/2019*	*09/30/2021*	Water quality monitoring is on schedule.

Missouri . . . FFY 2015 . . . EPA Grant # BG 99731308 . . . Expiration Date 30-SEP-17

processed with status:	# of projects	% of projects in grant
Completed	1	100.0%

Missouri . . . FFY 2015 . . . EPA Grant # C9 00740721 . . . Expiration Date 31-AUG-20

processed with status:	# of projects	% of projects in grant
Behind Schedule	2	9.5%
On Schedule	9	42.9%
Revised	1	4.8%
Completed	5	23.8%
Never Initiated	5	23.8%

Program	Grant Number	State	Appropriation Year	319 grant	Amount for All Projects	difference	balanced?
BG	99731308	MO	2015	$0	5,392,855	-$5,392,855	OVERSPENDING
C9	00740721	MO	2015	$1,738,050	2,310,795	$0	Yes, the budgets balance.

Missouri . . . FFY 2015 . . . EPA Grant # BG 99731308 . . . Expiration Date 30-SEP-17

Appropriation Year	nth year of grant	% ULO	319 Obligation Amount	319 Available Obligation Amount	319 Expended Amount

2015	5		$0	$0	$0

Missouri . . . FFY 2015 . . . EPA Grant # C9 00740721 . . . Expiration Date 31-AUG-20

Appropriation Year	nth year of grant	% ULO	319 Obligation Amount	319 Available Obligation Amount	319 Expended Amount
2015	4	40%	$1,738,050	$696,521	$1,041,529

Missouri . . . FFY 2015 . . . EPA Grant # BG 99731308 . . . Expiration Date 30-SEP-17

	# of projects	% of projects in grant
active	1	100.0%

Grand Total	**1**	**100.0%**

Missouri . . . FFY 2015 . . . EPA Grant # C9 00740721 . . . Expiration Date 31-AUG-20

	# of projects	% of projects in grant
NEEDS HUMAN ATTENTION	1	4.8%
active	17	81.0%
inactive	3	14.3%
Grand Total	**21**	**100.0%**

MISSOURI DEPARTMENT OF NATURAL RESOURCES

Grant Annual Performance Report (GAPR), Section 319 NPS Program

Missouri . . . FFY 2016 . . . EPA Grant # C9 00740722 . . . Expiration Date 30-SEP-21

Reporting Period: 10-1-18 through 9-30-2019

MO 2016 Grant, 2019 GAPR oct18--sept19

See the end of this report for abbreviations & definitions.

GRTS #	Project Title	Status Date	*Inserted Date*	Status	showing	Appropriation Year	Project Start Date	Project End Date	Status Comment
01	US Ambient Water Quality Monitoring Network - Phase II	09/30/19	*12/10/19*	On Schedule	active	2016	*01/01/2018*	*06/30/2020*	Project is on schedule.
02	UMC - Lakes of Missouri Volunteer Program	03/31/18	*11/21/18*	Completed	active	2016	*09/16/2016*	*03/31/2018*	The LMVP Cooperative Agreement has been renewed for another year under a different project number (G18-NPS-05, FY16 GRTS #111). The project period for this agreement has closed, and closeout documentation will be submitted to EPA.
02	UMC - Lakes of Missouri Volunteer Program	11/02/18	*11/02/18*	On Schedule	active	2016	*09/16/2016*	*03/31/2018*	Project on schedule. Field monitoring completed, chemical analyses will be run over the winter months.
03	Black Creek Leveraging for 2016 Grant	08/28/19	*12/09/19*	Behind Schedule	active	2016	*10/01/2016*	*09/30/2021*	A joint meeting with MoDNR and EPA staff was held in Sedalia to discuss a process for developing an XML file to enable bulk entry of leveraged projects.
04	Wilsons Creek Leveraging for 2016 Grant	08/28/19	*12/09/19*	Behind Schedule	active	2016	*10/01/2016*	*09/30/2021*	A joint meeting with MoDNR and EPA staff was held in Sedalia to discuss a process for developing an XML file to enable bulk entry of leveraged projects.

05	MBG - Deer Creek Watershed Initiative Phase III - Part 4	08/05/19	*08/05/19*	Revised	active	2016	05/18/2018	*12/31/2019*	The Department is in the process of approving an amendment to extend the project and budget periods for 3-months, from September 30, 2019 to December 31, 2019, to allow time needed for MBG to complete the project Scope of Work. The remaining work to be completed during the 3-months extension period of the subgrant agreement include installation of 12 Rainscape Cost-share BMPs, groundtruthing and field inspections for 12 BMPs, modeling report for the 2019 installed BMPs, a Community Leaders Task Force meeting, a Steering Committee meeting, two project invoices and required final reports (MBE/WBE, quarterly reports, annual report, final report).
05	MBG - Deer Creek Watershed Initiative Phase III - Part 4	11/22/19	*11/22/19*	On Schedule	active	2016	05/18/2018	*12/31/2019*	The project amendment #4 was approved by the Department 10/1/2019 and the subgrant agreement signed by the grant recipient 9/24/2019. The budget and project periods were extended to 12/31/2019.
06	North and Middle Fabius Water Quality Improvement Project Phase II-Part 2	11/02/18	*11/02/18*	Behind Schedule	active+	2016	03/01/2014	*10/31/2020*	Modeling was delayed, while covering other priorities. Project will be amended to provide a no cost-time extension to allow additional time for the modeling results to be incorporated into the WBP and provide time to address DNR and EPA's comments.
06	North and Middle Fabius Water Quality Improvement Project Phase II-Part 2	03/12/19	*03/14/19*	Behind Schedule	active+	2016	03/01/2014	*10/31/2020*	A no-cost project amendment was requested by the Schuyler County SWCD and approved by the Department to extend the budget and project periods from February 28, 2019 to October 31, 2019 to allow time needed to complete the watershed plan updates, project evaluation and final reports. A revised milestones schedule will be followed to help get the project back on schedule. The watershed modeling will be completed in March, with a watershed plan draft submitted to the Department for review by April 30, 2019. The PIP for the amendment was approved by EPA, February 7, 2019.

06	North and Middle Fabius Water Quality Improvement Project Phase II-Part 2	03/12/19	*03/14/19*	On Schedule	active+	2016	03/01/2014	*10/31/2020*	A no-cost project amendment was requested by the Schuyler County SWCD and approved by the Department to extend the budget and project periods from February 28, 2019 to October 31, 2019 to allow time needed to complete the watershed plan updates, project evaluation and final reports. A revised milestones schedule will be followed to help get the project back on schedule. The watershed modeling will be completed in March, with a watershed plan draft submitted to the Department for review by April 30, 2019. The PIP for the amendment was approved by EPA, February 7, 2019.
06	North and Middle Fabius Water Quality Improvement Project Phase II-Part 2	12/06/19	*12/10/19*	On Schedule	active+	2016	03/01/2014	*10/31/2020*	The subgrant amendment to extend the project and budget periods for one year was signed by the Schuyler Co SWCD 11/27/2019 and approved by the Department 12/2/2019. The budget and project periods were extended to 12/31/2020.
07	MCMC - Our MO Waters Agricultural Watershed Monitoring	05/06/19	*11/26/19*	On Schedule	active	2016	04/01/2016	*03/31/2019*	The project has been amended to allow for a no-cost four year time extension from March 31, 2019 to March 31, 2023. To date, a total of 352 separate water samples have been analyzed from a total of 17 sampling stations. Sampling will need to be conducted at each site for approximately 5 years in order to obtain a statistically significant dataset. The sites currently have 1-1.5 years of data collection completed. A no-cost, four ear time extension will allow for the remaining sample collection to be completed.
08	WCO - Little Sac Restoration and Improvement Project	05/31/19	*07/12/19*	Behind Schedule	active	2016	04/01/2014	*11/30/2019*	Project has been amended for a no-cost six month time extension to allow for time to complete the WBP for the Upper Little Sac. A draft plan has been submitted to the Department for initial review, but additional time is needed for comments/revisions, as well as EPA review and approval.
09	Spring River Leveraging for 2016 Grant	08/28/19	*12/09/19*	Behind Schedule	active	2016	*10/01/2016*	*09/30/2021*	A joint meeting with MoDNR and EPA staff was held in Sedalia to discuss a process for developing an XML file to enable bulk entry of leveraged projects.

10	UMC - Statewide Lakes Assessment Project	09/30/19	*12/11/19*	Completed	active	2016	*04/01/2018*	*03/31/2019*	Project completed. Closeout letters to be attached to GRTS
11	UMC - Lakes of Missouri Volunteer Program	09/30/19	*12/11/19*	Completed	active	2016	*04/01/2018*	*03/31/2019*	Project completed. Closeout letter to attached in GRTS
12	LOWA LILs and Clean Marina Project - Part 3	07/17/19	*07/17/19*	Pending	active	2016	*08/01/2016*	*07/31/2022*	This project is being amended to add an additional $283,000 in funding from the FY16 and FY18 319 implementation grants. This amendment will also serve to extend the project out an additional three years, from July 31, 2019 to July 31, 2022. Due to a lack of community participation the Clean Marina program has been removed from the scope of work for this project. The additional funds will be used to continue implementation of the LOWA LILs and septic maintenance, as well as two new projects designed to stabilize areas of eroding shoreline around the Lake. The shoreline stabilization demonstration project will install riprap along 1,215 linear feet of eroding shoreline adjacent to the Lake of the Ozarks Community Bridge. A pre-selected cove will also be saturated with multiple riprap projects to demonstrate improvements to water quality.
13	Timber Trail to Briar Ridge Channel Project - Part 2	11/22/19	*11/22/19*	On Schedule	active	2016	*10/01/2019*	*09/30/2021*	The project subgrant award was approved by the department 11/8/2019 and signed by the grant recipient 11/6/2019. The PIP was accepted by EPA 10/19/2019.
14	UMC - Lakes of Missouri Volunteer Program - Coopertive Agreement	09/30/19	*12/12/19*	Pending	active	2016	*04/01/2020*	*03/31/2021*	Project negations are occurring. A signed cooperative agreement will be attached at a future date.

Missouri . . . FFY 2016 . . . EPA Grant # C9 00740722 . . . Expiration Date 30-SEP-21

processed with status:	# of projects	% of projects in grant
Pending	2	14.3%
Behind Schedule	5	35.7%
On Schedule	6	42.9%
Revised	1	7.1%
Completed	3	21.4%

Program	Grant Number	State	Appropriation Year	319 grant	Amount for All Projects	difference	balanced?
C9	00740722	MO	2016	$1,796,500	2,088,862	$4,845	UNDERSPENDING

Missouri . . . FFY 2016 . . . EPA Grant # C9 00740722 . . . Expiration Date 30-SEP-21

Appropriation Year	nth year of grant	% ULO	319 Obligation Amount	319 Available Obligation Amount	319 Expended Amount
2016	3	64%	$1,796,500	$1,147,578	$648,922

Missouri . . . FFY 2016 . . . EPA Grant # C9 00740722 . . . Expiration Date 30-SEP-21

	# of projects	% of projects in grant
active	14	100.0%
Grand Total	**14**	**100.0%**

MISSOURI DEPARTMENT OF NATURAL RESOURCES

Grant Annual Performance Report (GAPR), Section 319 NPS Program

Missouri . . . FFY 2017 . . . EPA Grant # C9 00740723 . . . Expiration Date 30-SEP-22

Reporting Period: 10-1-18 through 9-30-2019

Filename: MO 2017 Grant, 2019 GAPR oct18--sept19

See the end of this report for abbreviations & definitions.

GRTS #	Project Title	Status Date	*Inserted Date*	Status	showing	Appropriation Year	Project Start Date	Project End Date	Status Comment
01	Greater Bonne Femme WBP Development and Demonstration - Part 2	11/16/18	*11/16/18*	On Schedule	active	2017	*07/01/2018*	*06/30/2020*	Project started, QAPP submitted.
02	City of Frontenac - Georgian Acres Stormwater Improvements though BMP Implementation Project	09/01/18	*11/21/18*	Never Initiated	inactive	2017	*08/01/2018*	*07/31/2019*	This project did not receive Department approval and was never initiated.
03	UMC - Statewide Lakes Assessment Project	09/30/19	*12/11/19*	Completed	active	2017	*04/01/2018*	*03/31/2019*	Project completed. Closeout letter to be attached to GRTS
04	TNC - Kiefer Creek Streambank Stabilization and Riparian Improvement Project - Part 1	08/22/19	*08/22/19*	Pending	active	2017	*10/01/2019*	*09/30/2021*	The project subgrant agreement is currently in the Department grant award approval process. Since the project will be implemented on State Park's property, a MOU between the Department, Missouri Office of Administration and The Nature Conservancy must be developed and signed before the subgrant grant award can be approved. Once the MOU is signed, the Department will proceed with approval. The current subgrant agreement/PIP was approved by EPA on February 14, 2019. Any changes made by the Department to the subgrant/PIP will be resubmitted to EPA for approval.
05	The James River Planning and Demonstration Project	08/30/19	*11/26/19*	Behind Schedule	active	2017	*05/01/2018*	*12/31/2020*	This project is being amended to extend the project period an additional 15 months, update the project objectives and schedule of milestones, and add an additional $36,611.11 in federal funding. This project was originally funded out of 604(b) funds, and a delay in changing the funding source has put the project

									behind schedule.
06	Shoal Creek Riparian Restoration and Enhancement Project	06/01/19	*11/26/19*	Pending	active	2017	*07/01/2019*	*06/30/2022*	A PIP for the Shoal Creek Riparian Restoration and Enhancement Project is being developed to implement a portion of the Spring River Watershed Plan. The project sponsor will be the Nature Conservancy.
07	Kiefer Creek Septic Improvement Feasibility Study – Phase I	08/15/19	*08/15/19*	Pending	active	2017	*10/01/2019*	*03/31/2021*	The Department is in the process of approving a subgrant award for the Kiefer Creek Septic Improvement Feasibility Study Project – Phase I. The project work plan (PIP) and budget are attached in GRTS for EPA review and approval.
08	USGS Joint Funding Agreement for James River Streamgage and WQ Monitoring	09/30/19	*12/10/19*	On Schedule	active	2017	*10/01/2019*	*09/30/2021*	Water quality monitoring is on schedule.
09	JRBP - Wilson's Creek Implementation - Part 3	05/21/19	*06/03/19*	Revised	active+	2017	*04/01/2017*	*03/31/2022*	The Department is in the process of approving an amendment for the project. The amendment will add $140,261 to the current grant award, shifts a partial budget to another grant, extends the project period two years, and updates the schedule of milestones. The overall grant award will also be reduced by $9,739. Funds in the amount of $166,117 from the FY2015 grant will be deobligated and replaced with funds from the FY2017 319 grant. The amendment will extend the project period two years from March 31, 2020 to March 31, 2022 to allow time needed to complete the project scope of work. The milestones completion dates will be revised to help get the project back on schedule. The total revised Section 319 federal award for the project of $550,976, will continue to support the project from April 1, 2017 through March 31, 2022. The project will be funded under three Section 319 NPS Implementation grants [FY2014 - $53,760 (expended), FY2015 - $190,838, and FY2017 - $306,378]. The revised work plan (PIP) has been entered in GRTS, and EPA has been notified to obtain approval.
09	JRBP - Wilson's Creek Implementation - Part 3	07/29/19	*08/05/19*	On Schedule	active+	2017	*04/01/2017*	*03/31/2022*	DNR received EPA approval to proceed with the project amended implementation plan

10	Missouri Botanical Garden Deer Creek Watershed Initiative Project - Phase IV (Part 1)	08/15/19	*08/15/19*	Pending	active	2017	*10/01/2019*	*09/30/2022*	The Department is in the process of approving a subgrant award for the Deer Creek Watershed Initiative Project – Phase IV. The project work plan (PIP) and budget are attached in GRTS for EPA review and approval.
10	Missouri Botanical Garden Deer Creek Watershed Initiative Project - Phase IV (Part 1)	11/22/19	*11/22/19*	On Schedule	active	2017	*10/01/2019*	*09/30/2022*	The project has officially started. The project subgrant award was approved by the department 10/8/2019 and signed by the grant recipient 10/2/2019. The PIP was accepted by EPA 11/15/2019.
11	Timber Trail to Briar Ridge Channel Project - Part 3	11/22/19	*11/22/19*	On Schedule	active	2017	*10/01/2019*	*09/30/2022*	The project subgrant award was approved by the department 11/8/2019 and signed by the grant recipient 11/6/2019. The PIP was accepted by EPA on 10/19/2019.
12	UMC - Lakes of Missouri Volunteer Program - Coopertive Agreement	09/30/19	*12/11/19*	Pending	active	2017	*04/01/2020*	*03/31/2021*	Negotiating Cooperative Agreement. A signed agreement will be attached to GRTS at a future date.
13	UMC - Statewide Lakes Assessment Project	09/30/19	*12/11/19*	Pending	active	2017	*04/01/2020*	*03/31/2021*	Cooperative Agreement being negotiated. A signed agreement will be attached to GRTS at a future date.
14	The Lake Taneycomo-White River WBP and Demonstration Project	09/30/19	*12/11/19*	Pending	active	2017	*11/01/2019*	*09/30/2022*	An application has been submitted by the project sponsor and an agreement is being drafted to route for approval.

Missouri . . . FFY 2017 . . . EPA Grant # C9 00740723 . . . Expiration Date 30-SEP-22

processed with status:	# of projects	% of projects in grant
Pending	7	50.0%
Behind Schedule	1	7.1%
On Schedule	5	35.7%
Revised	1	7.1%

Completed	1	7.1%
Never Initiated	1	7.1%

Program	Grant Number	State	Appropriation Year	319 grant	Amount for All Projects	difference	balanced?
C9	00740723	MO	2017	$1,858,500	2,319,241	$211,674	UNDERSPENDING

Missouri . . . FFY 2017 . . . EPA Grant # C9 00740723 . . . Expiration Date 30-SEP-22

Appropriation Year	nth year of grant	% ULO	319 Obligation Amount	319 Available Obligation Amount	319 Expended Amount
2017	2	100%	$1,858,500	$1,858,500	$0

Missouri . . . FFY 2017 . . . EPA Grant # C9 00740723 . . . Expiration Date 30-SEP-22

	# of projects	% of projects in grant
active	13	92.9%
inactive	1	7.1%
Grand Total	**14**	**100.0%**

MISSOURI DEPARTMENT OF NATURAL RESOURCES

Grant Annual Performance Report (GAPR), Section 319 NPS Program

Missouri . . . FFY 2018 . . . EPA Grant # BG 99731309 . . . Expiration Date 31-MAR-20

Reporting Period: 10-1-18 through 9-30-2019

File Name: MO 2018 Grant, 2019 GAPR oct18--sept19

See the end of this report for abbreviations & definitions.

GRTS #	Project Title	Status Date	*Inserted Date*	Status	showing	Appropriation Year	Project Start Date	Project End Date	Status Comment
01	FFY2018-2019 Performance Partnership Grant	09/30/19	*12/12/19*	On Schedule	active	2018	*10/01/2017*	*09/30/2019*	PPG final report to be attached once finalized.

MISSOURI DEPARTMENT OF NATURAL RESOURCES

Grant Annual Performance Report (GAPR), Section 319 NPS Program

Missouri . . . FFY 2018 . . . EPA Grant # C9 00740724 . . . Expiration Date 30-SEP-23

Reporting Period: 10-1-18 through 9-30-2019

File Name: MO 2018 Grant, 2019 GAPR oct18--sept19

See the end of this report for abbreviations & definitions.

GRTS #	Project Title	Status Date	*Inserted Date*	Status	showing	Appropriation Year	Project Start Date	Project End Date	Status Comment
01	TNC - Kiefer Creek Streambank Stabilization and Riparian Improvement Project - Part 2	08/22/19	*12/06/19*	Pending	active	2018	*10/01/2019*	*09/30/2020*	The project subgrant agreement is currently in the Department grant award approval process. Since the project will be implemented on State Park's property, a MOU between the Department, Missouri Office of Administration and The Nature Conservancy must be developed and signed before the subgrant grant award can be approved. Once the MOU is signed, the Department will proceed with approval. The current subgrant agreement/PIP was approved by EPA on February 14, 2019. Any changes made by the Department to the subgrant/PIP will be resubmitted to EPA for approval

02	LOWA LILs and Clean Marina Project - Part 3	07/17/19	*07/17/19*	Pending	active	2018	*08/01/2016*	*07/31/2022*	This project is being amended to add an additional $283,000 in funding from the FY16 and FY18 319 implementation grants. This amendment will also serve to extend the project out an additional three years, from July 31, 2019 to July 31, 2022. Due to a lack of community participation the Clean Marina program has been removed from the scope of work for this project. The additional funds will be used to continue implementation of the LOWA LILs and septic maintenance, as well as two new projects designed to stabilize areas of eroding shoreline around the Lake. The shoreline stabilization demonstration project will install riprap along 1,215 linear feet of eroding shoreline adjacent to the Lake of the Ozarks Community Bridge. A pre-selected cove will also be saturated with multiple riprap projects to demonstrate improvements to water quality.
03	Missouri Botanical Garden Deer Creek Watershed Initiative Project - Phase IV (Part 2)	08/15/19	*08/15/19*	Pending	active	2018	*10/01/2019*	*09/30/2022*	The Department is in the process of approving a subgrant award for the Deer Creek Watershed Initiative Project – Phase IV. The project work plan (PIP) and budget are attached in GRTS for EPA review and approval.
03	Missouri Botanical Garden Deer Creek Watershed Initiative Project - Phase IV (Part 2)	11/22/19	*11/22/19*	On Schedule	active	2018	*10/01/2019*	*09/30/2022*	The project has officially started. The project subgrant award was approved by the department 10/8/2019 and signed by the grant recipient 10/2/2019. The PIP was accepted by EPA 11/15/2019.
04	USGS Joint Funding Agreement for James River Streamgage and WQ Monitoring	09/30/19	*12/10/19*	On Schedule	active	2018	*10/01/2019*	*09/30/2021*	Water quality monitoring is on schedule.
05	Big Oak Tree State Park	09/30/19	*12/10/19*	Pending	active	2018			Working to develop an agreement in the form of a MOU.

06	MCMC - Our MO Waters Agricultural Watershed Monitoring	05/06/19	*11/26/19*	On Schedule	active	2018	04/01/2016	*03/31/2023*	The project has been amended to allow for a no-cost four year time extension from March 31, 2019 to March 31, 2023. To date, a total of 352 separate water samples have been analyzed from a total of 17 sampling stations. Sampling will need to be conducted at each site for approximately 5 years in order to obtain a statistically significant dataset. The sites currently have 1-1.5 years of data collection completed. A no-cost, four ear time extension will allow for the remaining sample collection to be completed.
07	The James River Planning and Demonstration Project	08/01/19	*11/26/19*	Behind Schedule	active	2018	*05/01/2018*	*12/31/2020*	This project is being amended to extend the project period an additional 15 months, update the project objectives and schedule of milestones, and add an additional $36,611.11 in federal funding. This project was originally funded out of 604(b) funds, and a delay in changing the funding source has put the project behind schedule.
08	The Lake Taneycomo-White River WBP and Demonstration Project	09/30/19	*12/11/19*	Pending	active	2018	*11/01/2019*	*12/31/2022*	An application for this project was submitted by the sponsor and an agreement is being drafted to route for approval.

Appendix E. Section 305(b) Report (Other Waters Rated as Impaired and Believed to be Impaired but not on the Section 303(d) list). The following list includes classified waters in Missouri found to be impaired, but do not qualify for §303(d) listing. This list includes waters with approved TMDLs; waters where sufficient pollution control measures have been implemented; waters believed to be impaired by pollution, but no discrete pollutants have been identified; and other waters that were not approved for §303(d) listing by the Clean Water Commission.

Waterbody ID	Waterbody Name	Impaired Size	County	Cause	Source	Category	HUC 8	Priority Watershed
4083	Barker Creek tributary (C)	1.2	Henry	pH	Source Unknown	4A	10290108	
4083	Barker Creek tributary (C)	1.2	Henry	Sulfates	Source Unknown	4A	10290108	
1746	Big Bottom Cr. (C)	0.6	Ste. Genevieve	Ammonia, Total	Municipal Point Source Discharges	4A	7140101	
1746	Big Bottom Cr. (C)	1.5	Ste. Genevieve	Oxygen, Dissolved	Municipal Point Source Discharges	4A	7140101	
2916	Big Cr.(P)	1.8	Wayne/Iron	Cadmium	Ind./Comm. Site Stormwater Discharge,	4A	8020202	
					Permittee		8020202	
2074	Big R.(P)	111.2	Jefferson	Lead	Mill Tailings	4A	7140104	
2080	Big R. (P)	133	Jefferson/Washington	Lead	Mill Tailings	4A	7140104	
2080	Big R.(P)	81.3	Jefferson/Washington	Lead	Mine Tailings	4A	7140104	
2080	Big R. (P)	52.7	Jefferson/Washington	Sedimentation/Siltation	Mill Tailings	4A	7140104	
417	Blue R. (P)	4.4	Jackson	Chlordane in Fish Tissue	NPS	4A	10300101	Priority
3118	Buffalo Ditch (P)	17.3	Dunklin	Oxygen, Dissolved	Source Unknown	4A	8020204	
3941	Cave Spring Br.(US)	4.4	McDonald	Nitrogen, Total	Industrial Point Source Discharge	4A	8020202	
3203	Center Cr. (P)	38	Jasper	Zinc	Mill Tailings	4A	11070207	Priority
640	Chariton R. (P)	111	Chariton/Putnam	Escherichia coli	Agriculture	4A	10280201	
3168	Chat Cr. (C)	2.1	Lawrence	Zinc	Subsurface, Hardrock, Mining	4A	11070207	Priority
1706	Coldwater Cr.(C)	13.8	St. Louis	Escherichia coli	Urban Runoff/Storm Sewers	4A	10300200	Priority
1703	Creve Coeur Cr. (C)	3.8	St. Louis	Escherichia coli	Urban Runoff/Storm Sewers	4A	10300200	Priority
1145	Dry Auglaize Cr. (P)	3	Laclede	Cause Unknown	Source Unknown	4B	10290109	
1145	Dry Auglaize Cr.(P)	1	Laclede	Oxygen, Dissolved	Source Unknown	4B	10290109	
811	E. Brush Cr. (C)	1.1	Moniteau	Oxygen, Dissolved	Municipal Point Source Discharges	4B	10300102	Priority
2186	Fishpot Cr.(P)	3.5	St. Louis	Escherichia coli	Urban Runoff/Storm Sewers	4A	7140102	
2168	Flat River Cr. (C)	9.4	St. Francois	Lead	Mill Tailings	4A	7140104	
2168	Flat River Cr. (C)	10	St. Francois	Lead	Mine Tailings	4A	7140104	
2168	Flat River Cr. (C)	4.7	St. Francois	Sedimentation/Siltation	Mill Tailings	4A	7140104	
2168	Flat River Cr. (C)	4.7	St. Francois	Zinc	Mill Tailings	4A	7140104	
1842	Fox Cr. (P)	7.2	St. Louis	Aquatic Macroinvertebrate Bioassessments	Source Unknown	4C	7140102	
883	Gabriel Cr.(C)	13.6	Morgan	Oxygen, Dissolved	Municipal Point Source Discharges	4B	10300103	
430	Grand R. (P)	8	Livingston/Worth	Fishes Bioassessments	Channelization	4C	10280101	

Waterbody ID	Waterbody Name	Impaired Size	County	Cause	Source	Category	HUC 8	Priority Watershed
593	Grand R. (P)	56	Chariton/Livingston	Escherichia coli	NPS	4A	10280103	Priority
593	Grand R.(P)	11.5	Chariton/Livingston	Fishes Bioassessments	Channelization	4A	10280103	Priority
1008	Hinkson Cr. (C)	6.8	Boone	Cause Unknown	Urban Runoff/Storm Sewers	4A	10300102	Priority
1007	Hinkson Cr. (P)	7.6	Boone	Cause Unknown	Urban Runoff/Storm Sewers	4A	10300102	Priority
1251	Honey Cr. (C)	8.5	Henry	Sulfates	Coal Mining	4A	10290108	
1946	Indian Cr. (P)	1.9	Washington	Lead	Mill Tailings	4A	7140102	
2681	Jacks Fk.(P)	7.5	Shannon/Texas	Escherichia coli	Municipal Point Source Discharges	4A	11010008	
2681	Jacks Fk. (P)	7.5	Shannon/Texas	Escherichia coli	Other Recreational Pollution Sources	4A	11010008	
3233	Joyce Cr. (C)	4.5	Barry	Escherichia coli	NPS	4A	11070207	Priority
7314	Lake Taneycomo (L2)	246	Taney	Dissolved oxygen saturation	Dam or Impoundment	4A	11010003	
7356	Lamar Lake (L1)	148	Barton	Nutrient/Eutrophication Biol. Indicators	NPS	4A	11070207	Priority
3105	Lateral #2 Main Ditch (P)	11.5	Stoddard	Sedimentation/Siltation	NPS	4A	8020204	
1438	L. Lindley Cr.(C)	3.7	Dallas	Aquatic Macroinvertebrate Bioassessments	Source Unknown	4B	10290107	
606	Locust Cr. (P)	19.4	Chariton/Putnam	Fishes Bioassessments	Channelization	4A	10280103	Priority
857	Long Br.(C)	6	Pettis/Johnson	Cause Unknown	Source Unknown	4A	10300103	
3652	L. Osage R. (C)	23.6	Vernon	Dissolved oxygen saturation	Source Unknown	4A	10290103	
1381	L. Sac R. (P)	37	Polk/Greene	Escherichia coli	Agriculture	4A	10290106	Priority
1381	L. Sac R. (P)	37	Polk/Greene	Escherichia coli	NPS	4A	10290106	Priority
2814	Main Ditch (C)	1	Butler	Ammonia, Un-ionized	Municipal Point Source Discharges	4A	11010007	
2814	Main Ditch(C)	13	Butler	Oxygen, Dissolved	Source Unknown	4A	11010007	
1308	Marmaton R. (P)	35.7	Vernon	Oxygen, Dissolved	NPS	4A	10290104	
2787	McKenzie Cr.(C)	4.7	Wayne	pH	Municipal Point Source Discharges	4A	11010007	
2787	McKenzie Cr.(C)	4.7	Wayne	pH	Source Unknown	4A	11010007	
2786	McKenzie Cr. (P)	6.3	Wayne	Oxygen, Dissolved	Municipal Point Source Discharges	4B	11010007	
1284	Middle Fk. Tebo Cr. (C)	3	Henry	Total Dissolved Solids	Coal Mining	4A	10290108	
1707	Mississippi R. (P)	0.4	Ste. Genevieve	Lead	Industrial Point Source Discharge	4A	7140101	
1707	Mississippi R. (P)	0.4	Ste. Genevieve	Zinc	Industrial Point Source Discharge	4A	7140101	
1234	Monegaw Cr. (C)	2.1	St. Clair	Sulfates	Coal Mining	4A	10290105	
1300	Mound Br. (C)	8.9	Bates	Dissolved oxygen saturation	Source Unknown	4A	10290102	
674	Mussel Fk. (C)	58	Macon/Sullivan	Escherichia coli	NPS	4A	10280202	
56	N. Fabius R.(P)	92	Marion/Schuyler	Habitat Assessment, Streams	Channelization	4C	7110002	
942	N. Moreau Cr.(P)	10.9	Cole/Moniteau	Oxygen, Dissolved	Source Unknown	4A	10300102	Priority
1031	Osage R.(P)	9.7	Osage/Miller	Aquatic Macroinvertebrate	Dam or Impoundment	4C	10290111	

Waterbody ID	Waterbody Name	Impaired Size	County	Cause	Source	Category	HUC 8	Priority Watershed
				Bioassessments				
1387	Pea Ridge Cr. (P)	1.5	Greene	Aquatic Macroinvertebrate Bioassessme	Source Unknown	4C	10290106	Priority
216	Peruque Cr. (P)	0.3	St. Charles	Cause Unknown	Dam or Impoundment	4C	7110009	
1444	Piper Cr. (P)	5.3	Polk	Aquatic Macroinvertebrate Bioassessments	Source Unknown	4A	10290107	
3232	Pogue Cr.(C)	2.5	Barry	Escherichia coli	NPS	4A	11070207	Priority
2128	Pond Cr.(C)	1	Washington	Sedimentation/Siltation	Mill Tailings	4A	7140104	
2128	Pond Cr.(C)	1	Washington	Zinc	Mill Tailings	4A	7140104	
2859	Saline Cr. (P)	1.7	Madison	Nickel	Mine Tailings	4A	8020202	
71	S. Fabius R. (P)	4.2	Marion/Knox	Fishes Bioassessments	Channelization	4C	7110003	
2170	Shaw Br.(C)	1.2	St. Francois	Lead	Mill Tailings	4A	7140104	
2120	Shibboleth Br. (C)	3	Washington	Lead	Mill Tailings	4A	7140104	
2120	Shibboleth Br. (C)	3	Washington	Zinc	Mill Tailings	4A	7140104	
2119	Shibboleth Br. (P)	1	Washington	Lead	Mill Tailings	4A	7140104	
2119	Shibboleth Br. (P)	1	Washington	Zinc	Mill Tailings	4A	7140104	
3231	Shoal Cr. (C)	5	Barry	Escherichia coli	NPS	4A	11070207	Priority
3230	Shoal Cr. (P)	31.4	Newton/Barry	Escherichia coli	NPS	4A	11070207	Priority
1870	Spring Cr.(P)	5.1	Dent	Oxygen, Dissolved	Municipal Point Source Discharges	4A	7140102	
1870	Spring Cr.(P)	5.1	Dent	Solids, Suspended/Bedload	Municipal Point Source Discharges	4A	7140102	
2835	St. Francis R. (P)	8.7	Wayne/St. Francois	Oxygen, Dissolved	Municipal Point Source Discharges	4A	8020202	
710	Stinson Cr. (C)	1.9	Callaway	Oxygen, Dissolved	Municipal Point Source Discharges	4A	10300102	Priority
710	Stinson Cr. (C)	1.9	Callaway	Oxygen, Dissolved	Natural Conditions, UAA Needed	4A	10300102	Priority
959	Straight Fk. (C)	6	Morgan	Chloride	Municipal Point Source Discharges	4A	10300102	Priority
686	Sugar Cr. (P)	6.8	Randolph	pH	Coal Mining, Subsurface	4A	10280203	
3822	Town Br. (P)	2.5	Polk	Cause Unknown	Source Unknown	4A	10290107	
3822	Town Br.(P)	1.1	Polk	Total Suspended Solids - TSS	Municipal Point Source Discharges	4A	10290107	
3822	Town Br. (P)	1.1	Polk	Total Suspended Solids - TSS	Source Unknown	4A	10290107	
2850	Trace Cr. (C)	0.4	Madison	pH	Natural Sources	4A	8020202	
1288	Trib. M. Fk. Tebo Cr. (C)	3.1	Henry	pH	Coal Mining	4A	10290108	
1288	Trib. M. Fk. Tebo Cr. (C)	3.1	Henry	Total Dissolved Solids	Coal Mining	4A	10290108	
3940	Trib. to Big Cr. (US)	0.6	Iron	Cadmium	Ind./Comm. Site Stormwater Discharge,	4A	8020202	
					Permittee		8020202	
3940	Trib. to Big Cr. (US)	0.6	Iron	Zinc	Ind./Comm. Site Stormwater Discharge,	4A	8020202	
					Permittee		8020202	

Waterbody ID	Waterbody Name	Impaired Size	County	Cause	Source	Category	HUC 8	Priority Watershed
1225	Trib. to Big Otter Cr. (C)	1	Henry	pH	Coal Mining	4A	10290108	
3663	Trib. to Indian Cr. (C)	0.3	Washington	Lead	Subsurface, Hardrock, Mining	4A	7140102	
3490	Trib. to L. Muddy Cr. (C)	1	Pettis	Temperature, water	Industrial Point Source Discharge	4A	10300103	
3216	Turkey Cr. (P)	7.7	Jasper	Zinc	Mill Tailings	4A	11070207	Priority
3282	Turkey Cr. (P)	1.2	St. Francois	Oxygen, Dissolved	Source Unknown	4A	7140104	
2863	Village Cr. (P)	1.9	Madison	Sedimentation/Siltation	Mill Tailings	4A	8020202	
1708	Watkins Cr.(C)	2.8	St. Louis City	Escherichia coli	Urban Runoff/Storm Sewers	4A	7140101	
613	W. Fk. Locust Cr.(C)	17	Sullivan	Oxygen, Dissolved	Source Unknown	4A	10280103	Priority
400	W. Fk. Sni-a-bar Cr. (P)	9	Jackson	Oxygen, Dissolved	Municipal Point Source Discharges	4A	10300101	Priority
400	W. Fk. Sni-a-bar Cr. (P)	9	Jackson	Oxygen, Dissolved	Source Unknown	4A	10300101	Priority
7009	Wyaconda Lake (L1)	9	Clark	Atrazine	Crop Production, Crop Land or	4A	7110001	
					Dry Land		7110001	

Appendix F. Potentially impaired waters.

The following waters are those for which there is some indication that an impairment to some designated use may exist, but the current data or information indicating the impairment do not meet the data requirements set out by Missouri's Section 303(d) Listing Methodology. As funding allows, the Department will conduct additional monitoring in these waters to determine if impairments exist.

Waterbody Id	Waterbody Name	Size	Potential Pollutant or Condition	Category Code	HUC 8	Priority Watershed
334	Agee Cr.	4.80	Habitat Degradation	3B	10240012	
2093	Allen Br.	1.80	Fish Bioassessments/Unknown	3B	7140104	
1799	Apple Cr.	44.80	Aquatic Macroinvertebrate Bioassessments/Unkown	2B	7140105	
282	Arapahoe Cr.	8.00	Habitat Degradation	3B	10240010	
2880	Back Cr.	3.80	Low Dissolved Oxygen	3B	8020202	
1209	Barker Cr.	15.00	pH	3B	10290108	
7068	Bean Lake	420.00	nutrients all supporting,but just below the site specific critiera; limited fish tissue Hg/chlordane data indicates impairment. Additional fish tissue samples recommended - TR	3B	10240011	Priority
115	Bear Cr.	36.20	Low Dissolved Oxygen	3B	7110005	
272	Bear Cr.	9.80	Habitat Degradation	3B	10240011	Priority
416	Bear Cr.	4.50	Habitat Degradation	3B	10300101	Priority
1015	Bear Cr.	6.00	Fish Bioassessments/Unknown	3B	10300102	Priority
1220	Bear Cr.	7.40	Habitat Degradation	3B	10290108	
3265	Beaver Br.	2.00	Aquatic Macroinvertebrate Bioassessments/Unkown	3B	11070208	
3266	Beaver Br.	3.50	Aquatic Macroinvertebrate Bioassessments/Unkown	3B	11070208	
3267	Beaver Br.	1.50	Habitat Degradation	3B	11070208	
1509	Beaver Cr.	5.70	Fish Bioassessments/Unknown	3B	10290201	
273	Bee Cr.	29.40	Habitat Degradation	3B	10240011	Priority
3966	Bee Fk.	5.90	Heavy metals in Sediment	2B	11010007	
2179	Belew Cr.	7.00	Fish Bioassessments/Low Dissolved Oxygen	3B	7140104	
220	Belleau Cr.	5.10	Habitat Degradation	3B	7110009	
1250	Big Cr.	70.50	Low Dissolved Oxygen	2B	10290108	
1608	Bigelow's Cr.	5.00	Low Dissolved Oxygen	3B	10300200	Priority
7185	Binder Lake	127.00	pH	2B	10300102	Priority
891	Blackwater R.	79.40	Habitat Degradation	2B	10300104	
421	Blue R.	12.00	Bacteria	2B	10300101	Priority

Waterbody Id	Waterbody Name	Size	Potential Pollutant or Condition	Category Code	HUC 8	Priority Watershed
993	Blythes Cr.	6.90	Nutients	3B	10300102	Priority
32	Bobs Cr.	1.70	nutrients all supporting,but just below the site specific critiera; limited fish tissue Hg/chlordane data indicates impairment. Additional fish tissue samples recommended - TR	2B	7110004	
1983	Brazil Cr.	13.90	Aquatic Macroinvertebrate Bioassessments/Unkown	3B	7140102	
276	Brush Cr.	7.40	Habitat Degradation	3B	10240011	Priority
408	Brush Cr.	5.90	Habitat Degradation	3B	10300101	Priority
2056	Brush Cr.	2.00	Fish Bioassessments/Unknown	3B	7140103	
336	Brushy Cr.	12.10	Habitat Degradation	3B	10240012	
377	Brushy Cr.	7.00	Habitat Degradation	3B	10300101	Priority
395	Brushy Cr.	2.20	Habitat Degradation	3B	10300101	Priority
7159	Bucklin Lake	17.00	nutrients all supporting,but just below the site specific critiera; limited fish tissue Hg/chlordane data indicates impairment. Additional fish tissue samples recommended - TR	2B	10280202	
2422	Bull Cr.	5.00	Habitat Degradation	2B	11010003	
3264	Bullskin Cr.	4.90	Fish Bioassessments/Unknown	2B	11070208	
363	Burr Oak Cr.	2.00	Habitat Degradation	3B	10300101	Priority
7120	Cameron Lake #1	25.00	Mercury in Fish Tissue	2B	10280101	
2431	Camp Cr.	1.00	Fish Bioassessments/Unknown	3B	11010003	
2833	Cane Cr.	9.80	Low Dissolved Oxygen	3B	11010007	
2560	Caney Cr.	7.00	Fish Bioassessments/Unknown	3B	11010006	
389	Carroll Cr.	9.40	Habitat Degradation	3B	10300101	Priority
322	Castile Cr.	40.20	Low Dissolved Oxygen	2B	10240012	
3225	Cedar Cr.	2.20	Habitat Degradation	2B	11070207	Priority
7048	City Lake #2 - Perry	7.00	Atrazine	3B	7110007	
292	Clear Cr.	13.00	Habitat Degradation	3B	10240010	
388	Clear Cr.	5.00	Habitat Degradation	3B	10300101	Priority
390	Clear Cr.	13.50	Habitat Degradation	3B	10300101	Priority
2082	Clear Cr.	4.40	Fish Bioassessments/Unknown	3B	7140104	
225	Cole Cr.	5.70	Habitat Degradation	3B	7110009	
269	Contrary Cr.	10.00	Mercury in Fish Tissue	3B	10240011	Priority
1459	Contrary Cr.	4.50	Fish Bioassessments/Unknown	3B	10290203	

Waterbody Id	Waterbody Name	Size	Potential Pollutant or Condition	Category Code	HUC 8	Priority Watershed
132	Coon Cr.	11.80	Low Dissolved Oxygen	2B	7110006	
410	Cottonwood Cr.	3.90	Habitat Degradation	3B	10300101	Priority
1947	Courtois Cr.	1.70	Aquatic Macroinvertebrate Bioassessments/Unkown	3B	7140102	
247	Cow Br.	4.40	Habitat Degradation	3B	10240005	
330	Crooked Cr.	2.80	Habitat Degradation	3B	10240012	
333	Crooked Cr.	4.00	Habitat Degradation	3B	10240012	
371	Crooked R.	58.10	Habitat Degradation	3B	10300101	Priority
376	Crooked R.	7.50	Habitat Degradation	3B	10300101	Priority
2616	Cypress Ditch #1	9.70	Aquatic Macroinvertebrate Bioassessments/Unkown	3B	11010008	
144	Davis Cr.	8.80	Low Dissolved Oxygen	3B	7110006	
255	Davis Cr.	3.50	Habitat Degradation	3B	10240005	
253	Davis Cr. Ditch	6.70	Habitat Degradation	3B	10240005	
320	Dicks Cr.	7.30	Habitat Degradation	3B	10240012	
268	Dillon Cr.	4.80	Aquatic Macroinvertebrate Bioassessments/Unkown	3B	10240011	Priority
2998	Ditch #10	3.50	Mercury in Fish Tissue	3B	8020203	
3813	Ditch #16	11.20	Low Dissolved Oxygen	3B	11010007	
2617	Ditch #2	3.20	Low Dissolved Oxygen	3B	11010008	
2077	Ditch Cr.	1.80	Fish Bioassessments/Unknown	3B	7140104	
2776	Ditch to Black R.	10.70	Habitat Degradation	3B	11010007	
3418	Dry Cr.	9.30	Fish Bioassessments/Unknown	3B	7140104	
1862	Dry Fk.	23.30	Aquatic Macroinvertebrate Bioassessments/Unkown	3B	7140102	
1314	Dry Wood Cr.	29.90	Sulfates	2B	10290104	
1265	East Cr.	9.40	Low Dissolved Oxygen	2B	10290108	
2085	Ebo Cr.	1.60	Fish Bioassessments/Unknown	3B	7140104	
288	E. Br. Elkhorn Cr.	4.70	Habitat Degradation	3B	10240010	
257	E. Br. Squaw Cr.	4.20	Habitat Degradation	3B	10240005	
3107	E. Ditch #1	22.00	Low Dissolved Oxygen	3B	8020204	
414	Edmondson Cr.	1.90	Habitat Degradation	3B	10300101	Priority
373	E. Fk. Crooked R.	6.40	Habitat Degradation	3B	10300101	Priority
386	E. Fk. Fishing R.	12.90	Aquatic Macroinvertebrate Bioassessments/Unkown	3B	10300101	Priority
249	E. Fk. L. Tarkio Cr.	17.80	Habitat Degradation	3B	10240005	
932	E. Fk. Postoak Cr.	12.20	Habitat Degradation	3B	10300104	
398	E. Fk. Shoal Cr.	2.90	Bacteria	2B	10300101	Priority
402	E. Fk. Sni-a-bar Cr.	9.60	Habitat Degradation	3B	10300101	Priority
287	Elkhorn Cr.	11.80	Aquatic Macroinvertebrate	3B	10240010	

Waterbody Id	Waterbody Name	Size	Potential Pollutant or Condition	Category Code	HUC 8	Priority Watershed
			Bioassessments/Unkown			
331	Elm Grove Br.	4.20	Habitat Degradation	3B	10240012	
3370	Fassnight Cr.	2.80	Aquatic Macroinvertebrate Bioassessments/Unkown	3B	11010002	
1705	Fee Fee Cr. (old)	1.00	Habitat Degradation	3B	10300200	Priority
1607	Femme Osage Cr.	2.00	Fish Bioassessments/Unknown	3B	10300200	Priority
4120	Fenton Creek tributary	1.50	Habitat Degradation	2B	7140102	
7201	Finger Lakes	118.00	Mercury in Fish Tissue	2B	10300102	Priority
375	Fire Br.	5.40	Habitat Degradation	3B	10300101	Priority
318	First Cr.	4.70	Bacteria	3B	10240012	
394	Fishing R.	8.50	Bacteria	2B	10300101	Priority
1885	Fishwater Cr.	4.80	Low Dissolved Oxygen	3B	7140102	
3587	Fleck Cr.	4.30	Sulfates	3B	10290104	
289	Florida Cr.	8.40	Habitat Degradation	3B	10240010	
3942	Foster Br.	1.10	Low Dissolved Oxygen	3B	10300102	Priority
3373	Galloway Cr.	3.20	Aquatic Macroinvertebrate Bioassessments/Unkown	3B	11010002	
407	Garrison Fk.	6.80	Habitat Degradation	3B	10300101	Priority
1496	Gasconade R.	11.20	Fish Bioassessments/Unknown	3B	10290201	
233	Greys Lake	5.20	Habitat Degradation	3B	10240004	
321	Grove Cr.	3.30	Habitat Degradation	3B	10240012	
3204	Grove Cr.	2.90	Aquatic Macroinvertebrate and Fish Bioassessments/Unknown	2B	11070207	Priority
285	Hayzlett Br.	2.40	Habitat Degradation	3B	10240010	
2181	Heads Cr.	2.70	Fish Bioassessments/Unknown	3B	7140104	
596	Hickory Br.	6.80	Low Dissolved Oxygen	2B	10280103	Priority
266	Hickory Cr	1.00	Habitat Degradation	3B	10240005	
308	Hickory Cr.	1.20	Habitat Degradation	3B	10240010	
335	Hickory Cr.	1.50	Habitat Degradation	3B	10240012	
229	High Cr.	6.30	Habitat Degradation	3B	10240004	
228	High Cr. Ditch	3.70	Habitat Degradation	3B	10240004	
307	Highly Cr.	3.90	Habitat Degradation	3B	10240010	
350	Holland Br.	3.00	Habitat Degradation	3B	10240012	
351	Holtzclaw Cr.	2.00	Habitat Degradation	3B	10240012	
338	Honey Cr.	6.70	Habitat Degradation	3B	10240012	
919	Honey Cr.	7.00	Habitat Degradation	3B	10300104	
354	Horse Fk.	4.40	Atrazine	3B	10240012	
306	Huff Cr.	2.00	Habitat Degradation	3B	10240010	
212	Indian Camp Cr.	3.50	Habitat Degradation	2B	7110008	

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3256	Indian Cr.	30.80	Habitat Degradation	2B	11070208	
7288	Indian Lake	279.00	Mercury in Fish Tissue	2B	7140103	
234	Iowa Ditch	2.80	Habitat Degradation	3B	10240004	
286	Jenkins Cr.	7.20	Habitat Degradation	3B	10240010	
1719	Joachim Cr.	30.20	Lead	2B	7140101	
3968	Jones Br.	0.00	VOCs in Sediment	3B	11010002	
974	Jones Cr.	4.00	Habitat Degradation	3B	10300102	Priority
275	Jordan Br.	7.20	Habitat Degradation	3B	10240011	Priority
329	Jordan Cr.	1.40	Habitat Degradation	3B	10240012	
384	Keeney Cr.	4.90	Habitat Degradation	3B	10300101	Priority
262	Kimsey Cr.	0.80	Habitat Degradation	3B	10240005	
263	Kimsey Cr.	2.50	Habitat Degradation	3B	10240005	
264	Kimsey Cr.	6.70	Habitat Degradation	3B	10240005	
1334	Kitten Cr.	7.20	Low Dissolved Oxygen	3B	10290105	
7064	Lake Contrary	291.00	Nutrients	3B	10240011	Priority
359	Lake Cr.	5.70	Habitat Degradation	3B	10300101	Priority
1656	L. Berger Cr.	1.20	Aquatic Macroinvertebrate and Fish Bioassessments/Unknown	3B	10300200	Priority
424	L. Blue R.	4.30	Habitat Degradation	3B	10300101	Priority
3591	L. Fox Cr.	0.70	Fish Bioassessments/Unknown	3B	7140102	
7111	Limpp Community State Lake	27.00	Mercury in Fish Tissue	2B	10240012	
280	Lincoln Cr.	7.40	Habitat Degradation	3B	10240010	
243	Long Br.	3.00	Habitat Degradation	3B	10240005	
3531	Long Grove Br.	3.20	Low Dissolved Oxygen	3B	10300103	
1617	Lost Cr.	6.40	Fish Bioassessments/Unknown	3B	10300200	Priority
403	L. Sni-a-bar Cr.	6.70	Habitat Degradation	3B	10300101	Priority
404	L. Sni-a-bar Cr.	7.50	Habitat Degradation	3B	10300101	Priority
409	L. Tabo Cr.	9.20	Habitat Degradation	3B	10300101	Priority
250	L. Tarkio Cr.	15.40	Habitat Degradation	3B	10240005	
251	L. Tarkio Ditch	6.60	Habitat Degradation	3B	10240005	
328	L. Third Fk. Platte R.	26.00	Habitat Degradation	3B	10240012	
425	Lumpkin Cr.	0.50	Habitat Degradation	3B	10300101	Priority
267	Mace Cr.	5.80	Habitat Degradation	3B	10240011	Priority
3277	Mason Springs Valley	1.00	Bacteria	3B	11070206	
1338	McCarty Cr.	13.20	Habitat Degradation	3B	10290105	
7319	McCormack Lake	9.00	Mercury in Fish Tissue	3B	11010011	
213	McCoy Cr.	1.90	Nutrients	2B	7110008	
231	McElroy Cr.	3.00	Habitat Degradation	3B	10240004	

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324	McGuire Br.	5.40	Habitat Degradation	3B	10240012	
1321	McKill Cr.	2.70	Sulfates and pH	3B	10290104	
1324	McKill Cr.	2.20	Sulfates and pH	3B	10290104	
31	McLean Cr.	6.60	Nutrients	3B	7110004	
2185	Meramec R.	15.70	Lead	2B	7140102	
691	M. Fk. Little Chariton R.	31.50	Sulfates	2B	10280203	
3415	Middle Big Cr.	9.40	Low Dissolved Oxygen	3B	10290108	
258	Middle Br. Squaw Cr.	3.00	Habitat Degradation	3B	10240005	
2744	Middle Fk. Black R.	21.00	Fish Bioassessments/Unknown	2B	11010007	
245	Middle Tarkio Cr.	10.00	Habitat Degradation	3B	10240005	
159	Mill Cr.	5.00	Aquatic Macroinvertebrate Bioassessments/Unkown	3B	7110008	
265	Mill Cr.	10.00	Habitat Degradation	3B	10240005	
301	Mill Cr.	10.80	Habitat Degradation	3B	10240010	
740	Millers Cr.	1.90	Aquatic Macroinvertebrate Bioassessments/Unkown	3B	10300102	Priority
1707	Mississippi R.	28.30	Bacteria	2B	7140101	
1544	Mistaken Cr.	1.50	Habitat Degradation	3B	10290203	
755	Moniteau Cr.	14.40	Sulfates and pH	3B	10300102	Priority
1315	Moores Br.	3.00	Habitat Degradation	3B	10290104	
302	Moss Br.	2.40	Habitat Degradation	3B	10240010	
369	Moss Cr.	13.70	Habitat Degradation	3B	10300101	Priority
426	Mouse Cr.	1.50	Low Dissolved Oxygen	2B	10300101	Priority
343	Mozingo Cr.	5.10	Habitat Degradation	3B	10240013	
291	Muddy Cr.	5.20	Habitat Degradation	3B	10240010	
391	Muddy Fk.	8.40	Aquatic Macroinvertebrate Bioassessments/Unkown	3B	10300101	Priority
277	Naylor Cr.	1.00	Habitat Degradation	3B	10240011	Priority
2752	Neals Cr.	3.20	Nickel in Sediment	2B	11010007	
392	New Hope Cr.	5.50	Habitat Degradation	3B	10300101	Priority
309	Nichols Cr.	4.60	Habitat Degradation	3B	10240010	
344	Norvey Cr.	9.30	Habitat Degradation	3B	10240013	
49	N. Wyaconda R.	9.20	Habitat Degradation	3B	7110001	
284	Old Chan. Nodaway R.	10.00	Habitat Degradation	3B	10240010	
294	Old Chan. Nodaway R.	1.20	Habitat Degradation	3B	10240010	
295	Old Chan. Nodaway R.	2.00	Habitat Degradation	3B	10240010	
297	Old Chan. Nodaway R.	1.50	Habitat Degradation	3B	10240010	
298	Old Chan. Nodaway R.	1.00	Habitat Degradation	3B	10240010	
299	Old Chan. Nodaway R.	2.50	Habitat Degradation	3B	10240010	

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300	Old Chan. Nodaway R.	3.70	Habitat Degradation	3B	10240010	
304	Old Chan. Nodaway R.	2.50	Habitat Degradation	3B	10240010	
305	Old Chan. Nodaway R.	2.80	Habitat Degradation	3B	10240010	
311	Old Chan. Nodaway R.	1.00	Habitat Degradation	3B	10240010	
325	Old Chan. Platte R.	3.40	Habitat Degradation	3B	10240012	
326	Old Chan. Platte R.	2.20	Habitat Degradation	3B	10240012	
332	Old Chan. Platte R.	4.00	Habitat Degradation	3B	10240012	
341	Old Chan. Platte R.	5.00	Habitat Degradation	3B	10240012	
348	Old Chan. Platte R.	1.00	Habitat Degradation	3B	10240012	
368	Old Chan. Wakenda Cr.	3.00	Habitat Degradation	3B	10300101	Priority
260	Old Ch. L. Tarkio Cr.	5.30	Habitat Degradation	3B	10240005	
261	Old Ch. L. Tarkio Cr.	8.30	Habitat Degradation	3B	10240005	
238	Old Ch. Nishnabotna R.	13.70	Habitat Degradation	3B	10240005	
240	Old Ch. Nishnabotna R.	3.00	Habitat Degradation	3B	10240005	
26	Old Kings Lake Cr.	6.20	Nutrients	3B	7110004	
1472	Osage Fk.	69.00	Bacteria	2B	10290201	
2962	Otter Cr.	6.00	Low Dissolved Oxygen	3B	8020202	
357	Palmer Cr.	12.20	Habitat Degradation	3B	10300101	Priority
358	Palmer Cr.	2.80	Habitat Degradation	3B	10300101	Priority
7441	Palmer Lake	102.00	Mercury in Fish Tissue	2B	7140102	
521	Panther Cr.	5.00	Habitat Degradation	3B	10280101	
2425	Peckout Hollow	1.80	Habitat Degradation	3B	11010003	
283	Pedlar Cr.	5.40	Habitat Degradation	3B	10240010	
1616	Peers Slough	3.00	Fish Bioassessments/Unknown	3B	10300200	Priority
349	Pigeon Cr.	7.20	Habitat Degradation	3B	10240012	
1728	Plattin Cr.	19.90	Ammonia	2B	7140101	
2058	Pleasant Valley Cr.	1.70	Habitat Degradation	3B	7140103	
2192	Pomme Cr.	1.80	Habitat Degradation	3B	7140102	
2127	Pond Cr.	1.30	Zinc in Sediment and Sediment Deposition	2B	7140104	
313	Prairie Cr.	3.70	Habitat Degradation	3B	10240012	
2037	Red Oak Cr.	5.20	Low Dissolved Oxygen	2B	7140103	
136	Reese Fk.	7.00	Low Dissolved Oxygen	3B	7110006	
347	Riggin Br.	1.90	Habitat Degradation	3B	10240013	
3827	River des Peres	3.70	Chloride and Bacteria	3B	7140101	
355	Roberts Br.	2.00	Atrazine	3B	10240012	
236	Rock Cr.	2.20	Habitat Degradation	3B	10240005	
237	Rock Cr.	19.00	Low Dissolved Oxygen	3B	10240005	

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378	Rocky Fk.	4.00	Habitat Degradation	3B	10300101	Priority
382	Rollins Cr.	7.00	Habitat Degradation	3B	10300101	Priority
278	Rush Cr.	4.50	Bacteria	3B	10240011	Priority
2189	Saline Cr.	1.80	Low Dissolved Oxygen	3B	7140102	
2190	Saline Cr.	2.30	Low Dissolved Oxygen	3B	7140102	
413	Salt Br.	5.70	Habitat Degradation	3B	10300101	Priority
290	Sand Cr.	4.90	Habitat Degradation	3B	10240010	
952	Scott Br.	0.50	Ammonia and Low Dissolved Oxygen	3B	10300102	Priority
317	Second Cr.	11.50	Habitat Degradation	3B	10240012	
1319	Second Nicolson Cr.	4.50	Sulfates	2B	10290104	
7253	See Tal Lake	11.00	Mercury in Fish Tissue	3B	10300200	Priority
921	S. Fk. Blackwater R.	5.70	Habitat Degradation	3B	10300104	
293	S. Fk. Clear Cr.	6.00	Habitat Degradation	3B	10240010	
385	Shackelford Br.	5.90	Habitat Degradation	3B	10300101	Priority
450	Shain Cr.	13.00	Nutrients	3B	10280101	
87	Sharpsburg Br.	1.50	Habitat Degradation	3B	7110004	
2865	Shays Cr.	1.70	Arsenic and Lead in Sediment	3B	8020202	
396	Shoal Cr.	10.30	Habitat Degradation	3B	10300101	Priority
397	Shoal Cr.	10.60	Low Dissolved Oxygen	2B	10300101	Priority
1934	Shoal Cr.	7.70	Fish Bioassessments/Unknown	3B	7140102	
3229	Shoal Cr.	0.50	Bacteria	3B	11070207	Priority
739	Smith Cr.	1.50	pH and Conductivity	3B	10300102	Priority
353	Smith Fk.	3.00	Habitat Degradation	3B	10240012	
7077	Smithville Lake	7190.00	Low Dissolved Oxygen	3B	10240012	
401	Sni-a-bar Cr.	4.30	Habitat Degradation	3B	10300101	Priority
3369	South Cr.	3.80	Bacteria	2B	11010002	
3	South R.	16.30	Nutrients	2B	7110004	
7187	Spring Fork Lake	178.00	Nutrients	2B	10300103	
3159	Spring R.	0.50	Metals in Sediment	3B	11070207	Priority
3167	Spring R.	1.00	Bacteria	3B	11070207	Priority
252	Squaw Cr.	21.00	Habitat Degradation	3B	10240005	
1486	Steins Cr.	16.60	Fish Bioassessments/Unknown	3B	10290201	
2355	Stewart Cr.	3.00	Fish Bioassessments/Unknown	3B	11010002	
2751	Strother Cr.	6.00	Aquatic Macroinvertebrate and Fish Bioassessments/Unknown	2B	11010007	
3965	Strother Cr.	0.90	Metals	2B	11010007	
1030	Sugar Br.	3.00	Nutrients	3B	10300102	Priority

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270	Sugar Cr.	3.00	Habitat Degradation	3B	10240011	Priority
271	Sugar Cr.	6.50	Habitat Degradation	3B	10240011	Priority
2866	Sweetwater Br.	1.00	Heavy metals in Sediment	3B	8020202	
2867	Sweetwater Br.	1.70	Lead in Sediment	3B	8020202	
405	Tabo Cr.	11.40	Habitat Degradation	3B	10300101	Priority
406	Tabo Cr.	8.40	Habitat Degradation	3B	10300101	Priority
2509	Tabor Cr.	5.60	Aquatic Macroinvertebrate and Fish Bioassessments/Unknown	3B	11010006	
7045	Teal Lake	84.00	Mercury in Fish Tissue	3B	7110006	
3130	Tenmile Pond	5.10	Nutrients and DDT	3B	8020201	
3763	Tiff Cr.	2.10	Fish Bioassessments/Unknown	3B	7140104	
2759	Toms Cr.	2.20	Metals	3B	11010007	
274	Trib. to Bee Cr.	1.80	Habitat Degradation	3B	10240011	Priority
3967	Trib. to Bee Cr.	0.50	Metals	3B	11010007	
2923	Trib. to Big Cr.	1.00	Metals in Sediment	3B	8020202	
323	Trib. to Castile Cr.	1.20	Habitat Degradation	3B	10240012	
393	Trib. to Clear Cr.	2.20	Habitat Degradation	3B	10300101	Priority
133	Trib. to Coon Cr.	2.00	Low Dissolved Oxygen	2B	7110006	
365	Trib to Crabapple Cr.	1.30	Habitat Degradation	3B	10300101	Priority
254	Trib. to Davis Cr.	3.00	Habitat Degradation	3B	10240005	
415	Trib. to Edmondson Cr.	3.10	Habitat Degradation	3B	10300101	Priority
374	Trib. to E. Fk. Crooked R.	4.80	Habitat Degradation	3B	10300101	Priority
429	Trib. to E. Fk. L. Blue R.	1.90	Habitat Degradation	3B	10300101	Priority
232	Trib. to High Cr.	2.00	Habitat Degradation	3B	10240004	
3962	Trib. to L. Blue R.	5.90	Habitat Degradation	2B	10300101	Priority
303	Trib. to Mill Cr.	1.80	Habitat Degradation	3B	10240010	
2115	Trib. to Mineral Fk.	2.00	Metals in Sediment	2B	7140104	
411	Trib. to Missouri R.	5.30	Habitat Degradation	3B	10300101	Priority
370	Trib. to Moss Cr.	0.50	Habitat Degradation	3B	10300101	Priority
310	Trib. to Nichols Cr.	1.30	Habitat Degradation	3B	10240010	
3261	Trib. to N. Indian Cr.	1.30	Aquatic Macroinvertebrate Bioassessments/Unkown	3B	11070208	
281	Trib. to Nodaway R.	1.00	Habitat Degradation	3B	10240010	
314	Trib. to Prairie Cr.	1.00	Habitat Degradation	3B	10240012	
2868	Trib. to Sweetwater Br.	1.00	Lead in Sediment	3B	8020202	
239	Tr. to O. Ch. Nishnabotna R.	0.90	Habitat Degradation	3B	10240005	
241	Tr. to O. Ch. Nishnabotna R.	2.00	Habitat Degradation	3B	10240005	
361	Turkey Cr.	4.70	Habitat Degradation	3B	10300101	Priority

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362	Turkey Cr.	3.50	Habitat Degradation	3B	10300101	Priority
412	Van Meter Ditch	4.50	Habitat Degradation	3B	10300101	Priority
360	Wakenda Cr.	29.20	Habitat Degradation	3B	10300101	Priority
364	Wakenda Cr.	10.60	Habitat Degradation	3B	10300101	Priority
2136	Wallen Cr.	1.40	Aquatic Macroinvertebrate Bioassessments/Unkown	3B	7140104	
1339	Walnut Cr.	2.30	Low Dissolved Oxygen	3B	10290105	
7137	Walt Disney Lake	19.00	Chloride and Sulfate	2B	10280103	Priority
2374	Ward Br.	3.30	Bacteria, Aquatic Macroinvertebrate Bioassessments/Unknown, pH	3B	11010002	
7087	Watkins Mill Lake	87.00	Bacteria	3B	10300101	Priority
7072	Waukomis Lake	76.00	Mercury and Chlordane in Fish Tissue	2B	10240011	Priority
379	W. Fk. Crooked R.	6.60	Habitat Degradation	3B	10300101	Priority
380	W. Fk. Crooked R.	9.80	Habitat Degradation	3B	10300101	Priority
3310	W. Fk. East Cr.	4.80	Habitat Degradation	2B	10290108	
929	W. Fk. Post Oak Cr.	12.80	Habitat Degradation	3B	10300104	
366	W. Fk. Wakenda Cr.	3.30	Habitat Degradation	3B	10300101	Priority
367	W. Fk. Wakenda Cr.	7.80	Habitat Degradation	3B	10300101	Priority
1639	Whetstone Cr.	10.80	Fish Bioassessments/Unknown	2B	10300200	Priority
230	W. High Cr.	2.80	Habitat Degradation	3B	10240004	
346	White Cloud Cr.	12.80	Habitat Degradation	3B	10240013	
259	Wildcat Cr.	4.00	Habitat Degradation	3B	10240005	
387	Williams Cr.	9.10	Habitat Degradation	3B	10300101	Priority
381	Willow Cr.	6.50	Habitat Degradation	3B	10300101	Priority
7110	Worth County Community Lake	17.00	Chlorophyll	2B	10280101	
244	W. Tarkio Cr.	1.20	Habitat Degradation	3B	10240005	
246	W. Tarkio Cr.	9.60	Habitat Degradation	3B	10240005	
47	Wyaconda R.	42.20	Bacteria	2B	7110001	